Exercises for crisis management training in intra-organizational settings

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ABSTRACT

In this article the focus is how to train collaboration and communication between emergency authorities in two countries (Norway and Sweden) by using a web-based tool supporting tabletop like exercises. The exercises are accomplished in three steps: Scenario design; exercise design and realization; and evaluation to examine the results of the exercises and for feedback to new scenario designs. The software ties all three steps together. The process is iterative, and involves users from each emergency authority. The preliminary results after two years show that the approach is promising. To be able to better foresee what will happen during an exercise the need for a simulator has appeared as one desirable and possible direction for further research.

Keywords

Training exercises, crisis management, scenarios, evaluation.

INTRODUCTION

Inter-organizational cooperation and collaboration between emergency authorities is challenging. Even if the emergency authorities work in the same geographical area and under the same jurisdiction, cooperation and collaboration can be extremely challenging. Different organizations, as well as individuals within organizations, understand the situation differently depending on their task, position, information, knowledge, organizational culture and preparedness for action (Dubois et al, 2012). Earlier research indicates that the final outcome of a disaster is highly dependent on early preparations and training prior to the outbreak of the crisis (Sundelius et al., 2001, Asproth et al., 2010). Boin and 't Hart (2007) argue that previous emergencies provide a good source for learning, for feasible planning and preparations for future emergencies. Despite these somewhat contradictory results, Asproth et al. (2010) claim that training for emergency situations can make people better prepared to manage an emerging crisis. In this article we take our departure from the complexity that you find in inter-national inter-organizational cooperation, and training as an early preparation technique.

To find a solution to an approaching emergency situation requires many authorities to cooperate, and each authority's expertise deals with certain tasks. However, in the border regions between countries it is also possible that an emergency situation occurs that will involve emergency authorities from more than one country. On a national level training is presented as a necessity to reach success in managing larger crisis on a national and regional level. The Swedish Civil Contingencies Agency is responsible for planning and implementing both national and regional training exercises. Nearly all countries have border regions in which an upcoming crisis or emergency situation will require authorities to cooperate across the national border and also across the national juridical borders. In Mid Scandinavia, in the rural areas around the border between Norway and Sweden, there is a collaboration between Norwegian and Swedish emergency authorities, which is the basis for this research. In this article we focus on situations where the crisis, the event, or emergency situation is of such character that an inter-national cooperation between emergency authorities is required.

We aim to present a model for how cooperative emergency training exercises can be designed, and how a web-based tool can serve both as an exercise platform and as an evaluation tool. The long-term goal for the research is to present how low-cost exercises can be designed in order to achieve more effective coordination, cooperation, and communication between intra-organizational crisis actors.

RESEARCH SETTINGS

This article is a joint research effort of three researchers which have all been involved in the research project described below. The method used has its basis in a qualitative research approach (Taylor & Bogdan, 1998). This research method can best be described as an action case research method (Braa & Vidgen, 1999), which is applicable when there is a mix of intervention and interpretation in the research, and where the underlying goal of research should be to gain new knowledge i.e. to increase understanding. In this research we, as researchers, have been taking an active part and intervened with both the design of the training exercise and the actual implementation of the exercise.

The research in this paper is carried out in a project called Gaining Security Symbiosis – GSS. The project is a joint research project between Sweden and Norway, where the aim is to generate new knowledge about cooperation between central risk and crisis actors in Sweden and Norway. This project is responsible for arranging three training exercises. The overall goal of GSS is to contribute to increased security and thereby also increased quality of life for both the resident population and visitors to the border region. So far two exercises have been completed and therefore this paper should be interpreted as research in progress.

RESULTS

The project is based on three parts: scenarios, exercise and evaluation. These three parts were spread throughout the year. The design of the scenario involved representatives of all actors in the GSS project.

Scenario

Scenarios can be used to reduce uncertainty by making the future structured into "predetermined and uncertain elements" (Wack, 1985, p. 140). In crisis management, exercise scenarios can be used in many ways, and within the IS community scenarios are also used to: "present and situate solutions, to illustrate alternative solutions, to identify potential problems" (Bødker, 2000, p. 63). Scenarios contain: "(1) actors, (2) background information on the actors and assumptions about their environment, (3) actors' goals or objectives, and (4) sequences of actions and events" (Go & Carrol, 2004, p. 46), which makes them very useful in enriching emergency exercises.

These scenarios have been created in close cooperation with representatives of the actors that were involved in the exercise. The overall method for how to create the scenarios has been to meet and discuss the goals of the exercise, possible events and tasks and timeline. Since the actors are different from one another, the researcher's role has been to identify common interests. To be able to meet the desires of different actors, a set of important characteristics have been used to evaluate each suggested event and task. These characteristics were issues like actor involvement, realism and the geographical location of each event, variations and differences of events.

Before proceeding with the exercise the scenario had to be validated. The text version of the scenario was made digital in the training software. The scenario was run through a number of times to make sure that the timeline was correct, that the event/task was presented to the appropriate actors and spelling and grammar checks were performed. The validation was also done by setting up an excel sheet for validation to see when different actors were involved in the exercise. With the actor in the x-axis and events and tasks in the y-axis it was easier to see how the events and tasks were distributed. All errors were reported and fixed before the exercise; the validation was actually an activity that occurred between the scenario and the exercise phase.

Exercise

In the introduction of the course for Exercise design by FEMA (FEMA - Emergency Management Institute, 2003) one premise is highlighted: "emergency exercises are worth the effort" (FEMA - Emergency Management Institute, 2003). There are many ways to carry out exercises as e.g. table-top exercises, functional exercises, and full scale exercises (FEMA - Emergency Management Institute, 2003). During the first exercise all actors from Norway were placed together in one room and all Swedish actors were placed together in another room. In each room there were two exercise leaders that were responsible for making the actors respond to the different events. A conference telephone was set up as a communication channel between Norway and Sweden, making it possible for the actors to communicate with each other. The second exercise was decentralized, meaning that all actors stayed at their regular working places. The scenario was presented through the training software. The actors could communicate through the training system and by using the phone. In the second exercise there were two people leading the exercise through the training software.

In order to build scenarios, to plan and complete exercises and to perform evaluations in a systematic way, a training software has been developed. The software is web-based which makes it possible to use in different platforms and from different locations at the same time. During the exercise all actors use the software and the

events are presented on the screen. In the software they have functions for sending and requesting information and a log for decisions. All actions carried out are stored in a log which is also visible on the screen at all times. All actions are time stamped. Actions related to information are also sent to those concerned making it possible to establish a two-way communication. Other activities are only visible to the actors who have documented them.

Evaluation

When performing a large scale project like GSS, to obtain more effective coordination, cooperation, and communication between intra-organizational crisis actors, there is a need for a thorough evaluation. One example of the use of the evaluation of crisis management is Andersson et al (2008). In our project the main issue is to improve cooperation and communication between the actors, which entails a certain focus on the evaluation. It is also of great importance to be able to use the results from the evaluation as feedback when creating new scenarios and exercises.

To achieve as complete and adequate data as possible from the exercises we have used many acquisition methods. The most important source is the logging system. During the exercises everything has been logged in the training software. In addition, there have been observers who have registered their observations in the system. A playback function is built in to the system where you can go back to the timestamps of your choice. Surveys before and after have been used to measure the experienced effect of cooperation and communication. The survey includes questions about the knowledge of each other and if and how they use it to communicate and collaborate. The current sample is quite small, but as we are going to have data covering a period of three years it will be possible to see tendencies. Summaries of data from the exercises are provided in the debriefing session taking place shortly after the completion of the emergency training session.

To analyze the data an open source statistic package (R Project), available on the simulation engine server, have been used. The data from the emergency management exercise was aggregated and prepared for graphical analysis using a sequence of programming tools (php programming and R statistics batch scripts). Furthermore, the R-project statistics package has been used to perform a Social Network Analysis (SNA) of the simulation data from May 2011. John Scott (1987) and Francesco Martino & Andrea Spoto (2006) provide a thorough review of Social Network Analysis, and the use of R-statistics for data analysis in general and for SNA analysis in particular is well documented (Ekker, 2009; Handcock et.al. 2008).

One analysis that can be done in the system is on communication. The analysis of the results shows that there is a substantial variation in communication, both between actors and over time. Through analysis of the scenario and the events in the exercise, it is possible to deduce the intended effects and compare them with the real effects in the system. Most of the variations can be explained by how the scenario and the exercise are constructed. An explanation to some smaller irregularities was that actors in some situations ignored standard procedure.

The data that have been collected from observations has also been used in the evaluation phase. During the training exercise the observers (positioned at all sites where the training exercise was taking place) collected data about the current activities which were a part of the exercise but also data about the exercise itself was collected. This means that the observer's data contributed to the evaluation in two ways. First the data supported the evaluation about what happened during the exercise, what actions the actors carried out etc. In addition, the data from the observers also helped to evaluate the exercise and the software used. One example of such an observation is when during training software was used to a greater extent and we were able to observe the need for a function to follow a trace. Some actors had a heavy workload during some parts of the exercise and therefore failed to note requests for information or work tasks because of the length of the log.

DISCUSSION

Finally, the experiences from the exercise were evaluated to be able to design scenarios of higher quality. There are a lot of things to consider when working with management training in intra-organizational settings; making the exercise realistic is one of the most important things to bear in mind. There has to be a balance between the different considerations. Some conclusions based on what has been learned from two years of exercises have been drawn. We have noted that some actors have few tasks in the exercise and have felt somewhat redundant. There are different ways to overcome such deficiencies. One is to make sure that all actors have sufficient involvement in the exercise. Another way is to let the actors with little involvement participate in the exercise only during the part/s when they are needed. The communication during the exercise also varies due to the frequency of event. This is of course a reflection of the realism of the exercise, but adjustments could still be made.

The need for a simulator has emerged as a way to be able to predict what could happen during an exercise. The

scenario and the events of the exercise are entered into such a simulator, as is as the expected communication which will be the result of the events. The outcome of the simulation would indicate if there are redundant actors and if there are unnecessary long waits. To build the simulator would preferably be the next step in the project.

Another issue that is seen as an important factor is the user's involvement in the design of the scenario and the exercise. Without this involvement it would have been impossible to build realistic scenarios and exercises. During the design of the scenarios discussions have been carried out about the realism of different type of events. The actors have not always been in agreement when it comes to which events should be the most realistic and challenging ones. Active participation in the design of scenarios and exercises gives the actors an opportunity to learn about each other's organizations. Both when it comes to what is seen as problematic but also why an actor reacts in a certain way in a crisis situation. This means that in exercises that aim to train people in cooperation it is important that all types of organizations are represented in the planning phase. Actors (both those that have participated in the exercise and those who have contributed in the scenario and exercise planning) have shown through deep involvement that they think that the exercises are important. Shortly after the first exercise there was a similar rescue action, almost identical to one of the events in the scenario. The actors mentioned the exercise and that it had been valuable since the action benefitted from better communication also in the real-life crisis.

The meetings about the scenario and the exercise have attracted a lot of participants which we interpret as positive feedback to our model. The external actors have, as described, been important but the fact that some of the researchers have been involved in both scenario and exercise or both scenario and evaluation have made the handover easier. It has also stimulated the use of several perspectives since the researchers represent different academic fields (informatics, computer science and sociology). To involve the actors to an even higher degree, future exercises will include actors (that will be included in the exercise management group) who, during the exercise, can give the participants of the exercise feedback, which will create a more dynamic exercise.

One of the goals of the project has been for the actors to be able to plan and perform and to some extent also evaluate an exercise themselves when the project has ended. When it comes to the scenarios and the exercise parts, the events and tasks have to be manually entered into the system. It could be helpful with some kind of scenario editor that could be used by the actors themselves; this would preferably be the next step in the project. To reach this long-term goal it is necessary for the actors to be able to walk through previous exercises and based on the evaluation be able to reuse events that have been particularly problematic or that have caused interesting patterns of communication. There is already a feedback function in the system but it needs to be searchable and extended with connections to different types of evaluations. There are some issues remaining, such as manuals/descriptions for both the model and the software, in order to reach the overall goal.

CONCLUSIONS

The aim of this article was to present a model for how cooperative emergency training exercises can be designed and how a web-based tool both can serve as an exercise platform and as an evaluation tool. The model that has been developed has been used to design exercises in crisis management training in intra-organizational settings. The model has been used twice, and so has the training software. The model and the training software have been evaluated by the use of systematic evaluation (of both of the effects of the training and the scenario) and have been refined in two steps. The base of the model consists of three parts: scenario, exercise and evaluation and it has been concluded that it is important with a high level of overlap and several iterations. The training software can be described as glue that facilitates the connection between the three parts. The iterations should be between the different parts but also within the three main parts. A number of issues for further research have also been presented and the development of the model will continue.

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