Creation of an Exercise Scenario: A Collaborative Design Effort

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ABSTRACT

To increase the preparedness Crisis response and management authorities carry out various forms of exercises. This article is based upon a three year long project named Gaining security symbiosis (GSS). The project was aiming to increase the collaboration between crisis actors in the Swedish-Norway border region through exercises. We argue that creation of scenarios is a design challenge. In the GSS project, the exercises are built upon designed scenarios, which should make the exercise realistic and make the trainee train the expected. We propose a scenario design method that is built upon an iterative approach and that includes collaboration with the actors that are involved in the exercise. The method also includes a set of characteristics that could be used to evaluate the events of the scenario. The method have been developed and refined during the project and show some promising result. There is however a need for future research when it comes to further development and evaluation of the proposed design method.

Keywords

Crisis management, Exercise, Design, Scenario

INTRODUCTION

Crisis response and management is somehow a necessary evil that many of us, from the bottom of our heart hope, never will have to be used. However we all know that crisis happen and needs to be managed and responded upon, and when crisis happen many require the crisis response and management system to work as good as possible. To increase the preparedness crisis response and management authorities carry out various forms of exercises. Earlier research indicates that the final outcome of a crisis is highly dependent on early preparations and training prior to the outbreak of the crisis (Sundelius et al., 2001, Asproth et al., 2010). For the first responders, e.g. the police the more operational training can be very realistic by for example using FX ammunition[1], which by many police forces are used to train and prepare officers for dangerous situations in a secure training environment. But how could the management level perform training in a secure and realistic environment? There are different types of exercises, everything from full-scale exercises, functional exercises to minor tabletop exercises. All these exercises aim to train and prepare the management level of organizations so that they can perform with higher quality during a crisis. The full-scale and the functional exercise are often costly and you rarely run more than one exercise in an organization each year. To argue that it is very important to design the exercise as good as possible is very relevant. If an organization is running a minimum of exercises each year it is important to train the most necessary each time, train with high impact and in an efficient manner. In the handbook/instructions of how to set up training exercises you find a similar and rather generic design structure (see e.g. Alberta Emergency Management Agency, 2012; FEMA - Emergency Management Institute, 2003; Myndigheten för samhällsskydd och beredskap, 2009). The exercises themselves are rather simplified. There are almost a generic design for the full-scale, functional and table top exercises. What is then the design challenge for exercises? In this article we argue that the design challenge is the scenario that the exercise is built upon which should make the exercise realistic and make the trainee train the expected. If you look through some of handbooks in how to set up exercises you rarely find any hands on tip on how to design the scenario. E.g. the MSB – Swedish Civil Contingencies Agency present that the scenario consists of several minor components, but

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[1] http://simunition.com/en/home

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MSB do not present any method proposal of how to design the scenario (Myndigheten för samhällsskydd och beredskap, 2009). The same lack of hands on guidance in the scenario design process is found in other manuals as well (see e.g. Alberta Emergency Management Agency, 2012; FEMA - Emergency Management Institute, 2003).

Designing scenarios for one organization can be challenging, and if you involve more organizations in the exercise the complexity arise. If you would add authorities from several countries the design team would need to take into consideration several different crisis response and management contexts. In this article we propose a collaborative design approach for how to succeed with the scenario design in a complex exercise environment. The proposed approach has been tested, evaluated and refined during a three years project. The structure of this article is as follows. First the research method is presented followed by presentation of the proposed design approach. The article ends with the results from assessment and evaluation of the method.

RELATED RESEARCH

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. There are a lot of examples of that scenarios are used but Moats et.al (2008) argues that there is a need for research within this area especially from a qualitative research perspective saying "*Qualitative research with scenario-planning participants would be very valuable in terms of gaining a better understanding of what makes scenarios effective or ineffective, and yet it is missing from the literature entirely. p. 17*" Moats et al argue for that scenarios and scenario planning can be useful for managers to better be able to reduce risk in their organizations (Moats et. Al 2008). There are some examples of earlier research about scenario design e.g. Lundberg et. al 2012 who present a method that can be used to support evaluation of new technologies. According to Reuter et. al (2009) scenario technique has been used in learning situations for several years. In their paper they recommend mention scenario management as one of the issues that is important to work with when designing exercises. Further, Yao et. al (2010) states that it is important to work in a collaborative way when designing scenarios. Since face-face meetings sometimes can be problematic they have developed a tool to be able to design scenarios.

RESEARCH APPROACH AND CONTEXT

This article is based upon a three year long project named Gaining Security Symbiosis (GSS). The GSS project was aiming to increase the collaboration between the police, the fire departments and the emergency medical service, electric suppliers and the county boards in the Swedish-Norway border region. This was primarily achieved by arranging one large training exercise each year. The GSS project was consisting of four different parts: A) Exercise preparation, planning and realization; B) Scenario design; C) Training software design; D) Evaluation (Asproth et. al 2013). The boundaries between these parts both can look less distinct, but the parts represented separate responsibilities amongst the researchers. The result in this article is from B, Scenario design. The project consisted of representatives from the Swedish & Norwegian police, Swedish and Norwegian fire departments, and Swedish & Norwegian electric suppliers together with researchers from a Swedish and a Norwegian university. The research part of the project is best described as an action research (Greenwood & Levin, 2007), where the researchers during three years actively intervened taking the form of a action research project the researchers were active intervening in the process aimed to increase the collaboration between Swedish and Norwegian emergency responders. Collaboration processes in this project is about to get knowledge about each other and each other's resources. The second step is to share those resources. To be able to become better to collaborate, communication is seen as one of the most important factor.

The GSS projects training exercises was not identical each year. Year 1, the training exercise was a tabletop exercise where Norwegian participants sat together in one room, and the Swedish participants sat together in another room. The exercise scenario was distributed through a web based designed software, which also was used for communication between Norway and Sweden. During Year 2 & 3 of the project, the training exercise took place in form of a distributed tabletop exercise where each organization used their ordinary premises, and their ordinary equipment. The exercise was managed and controlled with web-based software developed for this kind of exercises[2]. The exercises have been focusing on everyday relevant crisis. The background has all three

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[2] Information about the software used in the GSS project is found on the project web page: http://netgss.org

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years been a bad weather situation often with consequences on the infrastructure in the area.

Scenario design approach

In this section a presentation about how the Scenario design was carried out is described. This part of the GSS project has applied a design science approach (Hevner, March, & Park, 2004). The scenario is here seen as an artifact.

At the start of the project the scenario design group proposed a design method for the scenarios. It was early decided that the design should rest upon a collaborative work, in which researchers and practitioners together worked to come up with a scenario. The design followed an iterative approach see figure 1.
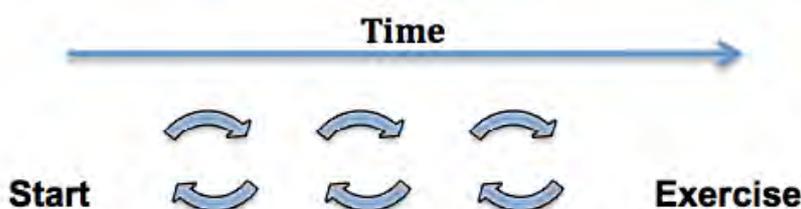

Figure 1. Our proposed method

The iterations roughly can be described as 2 phases that iterated 3 times the iterations is visualized by arrows. One pair of arrows should be interpreted as an iteration round. Phase **one** was where researchers together with practitioners designed the outline of the scenario. Preliminary decisions what events that wanted to be included in the scenario were made. Direct after the meeting with practitioners the researchers wrote the scenario that included all the events that have been decided. The scenario was then delivered to the collaborators that in phase **two** were evaluating the scenario. The evaluation were done by the practitioners in their home environment, and they had at least 1 week to read the scenario and reply with comments. After all comments have been received a call for next iteration was sent out, and phase **one** started over again. After 2-3 iterations the live evaluation was set up. It was important that the designed scenario not only satisfied the practitioners need. It was also very important that the scenario could work in the software used for the exercise. The result from phase 1&2 was a text that described the background of the scenario a list of event and tasks with a timeline. This was in this final scenario evaluation, made digital in the training software. The scenario was then walked through a number of times to make sure that the time line was correct, that the event is presented to the correct actors and of course also spell and grammar checks. The validation was also done by setting up an excel sheet to make validation to see when different actors are 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 dispersed. All errors were reported and fixed before the exercise.

SUMMARY OF SCENARIO DESIGN

The scenarios have been created in tight cooperation with representatives for the actors that were involved in the exercise. 8 actors have been involved in the scenario design, 4 from Norway and 4 from Sweden. Those have represented those organizations that the exercises have been designed for. The overall method for how to create the scenarios has been to meet and discuss the goals for the exercise, possible events and tasks and the timeline. The goals of the project have of course also been an input to those meetings. During the scenario meetings the level of details has increased. To be able to meet desires of different actors a set of important characteristics have been used to evaluate each suggested event and task.

Actor involvement. For each event or task it has been important to discuss questions like, which actor should be the one that own the problem? Which actor should be the main-receiver of the event? Will this event include several actors? One example is that the research group discussed an event with an accident with a truck loaded with dangerous gas. At the first meeting the representatives thought this was an interesting event with many challenges. At the next meeting the representative from the fire department says that accidents with dangerous gas would only make the local fire brigade call in experts and a lot of waiting for them to come. So, this was not a scenario that would have involved the actors that participated in the exercise.

Trustworthiness and plausible. For each event and for the scenario as a whole, one of the key features has been to create trustworthy and plausible scenarios. This leads to that the whole scenario has been evaluated by the representatives discussing whether or not an event is trustworthy/plausible. Many of the representatives from the actors have the experience that it is common that scenarios and exercise often include too many improbably

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events. It is challenging enough to cooperate in ordinary parallel events since the resources in this geographical are strictly limited. The resources are of course always limited but the geographical area of this project includes longer distances between the resources than other regions. The resources are also adjusted for (as always) to the habitants in the region but since tourism is one of the economical cornerstones of this region the citizens that needs help are much higher in some periods of time.

Geographical location. Since one of the project goals are to reach cooperation and coordination between Norway and Sweden the geographical location of all events have been central. Events near the border will bring in actors from both countries. For almost all the actors maps and thereby geographical locations are natural elements of a work task. For example where a car accident has happened, where a suspect had been seen or where there are problems with the electricity or heating.

Cooperation/coordination. As mentioned before one of the project goals was to reach a higher level of cooperation and coordination between the actors and between the countries. The importance of coordination and cooperation in risk and crisis management is well known (see for example Svensson 2007, Calloway & Keen 1996 and Heath & Luff 1992) and one way to achieve this is by performing exercises together. The scenarios include cooperation between actors, and each single suggested event in the scenario has been discussed and designed with a goal to encourage cooperation and communication. This can be exemplified by questions like: *Will this event make the Swedish police forced to contact the Norwegian police? What might the intention be, ask for information or give information? Will this contact be made directly after an event is presented in the scenario or will it take a while? What other resources organization will the actor try to contact in order to give or to get information?* During the design, the group tried to forecast possible outcome this was done in discussion format. And with up to 5-10 different actors and 20 events all the variations were problematic to grasp.

Richness and differences. Creating scenarios has also been a challenge when it comes to richness and differences. It is important that the scenario meet different needs from the actors and therefore it have been important to discuss both richness and differences. Examples of this are nationalities, actor, gender, age and type of events and tasks. This is both important from a learning perspective meanwhile an accident with a bus with Norwegian passengers compared to a bus with tourists will influence how the situation is dealt with. It influences for example which language to use, how to spread the information and so on. Richness and differences are also important from a trustworthiness perspective since scenarios that include just car accidents are not plausible enough.

Reaching the goals. The processes of creating a scenario start with deciding the goals of the exercise. Those goals were documented and several times at each meeting the group went through the goals to be able to determine if the suggested event and forecasted outcome will lead to the goal.

Differences. One of the goals of the project is to create scenarios that include differences between the two countries when it comes to organization and structure for risk and crisis management. To be able to discuss this it has been a real asset to have representatives from several actors and both countries in the group that created the scenario. Through use of forecasting possible outcomes differences were relieved. Those identified differences made that we chose some of the events or tasks that will make the organization exercise on issues that would learn them about those differences.

TENTATIVE RESULTS

We argue that the proposed method for designing scenario works well and this is based upon the general results from the three year GSS project. As described before the project has been working with evaluation in a separate phase. The tentative results points out that the actors involved are satisfied with the exercises and there are examples of the usefulness of the exercises in real life situation (Asproth et. al 2013). This type of evaluation is of course important to show the relevance of our proposed method but there also need for reflection that are done more qualitative and reflective with the scenario design method in focus. Our reflections so far are that the iterative and collaborative base in our method constitutes a solid base but there is a need for further research when it comes to techniques and eventually also some Information System support to be able to balance the different need from the actors. When we run the exercises we have noticed that some actors become very peripheral. This is of course tightly related to the characteristics of the crisis and how the actors that are involved in the exercise will define the crisis. To be able to design scenarios that are realistic, it is of course important that all actors keep their ordinary roles. But with so many actors involved the tools that have been used, (excel sheets) to keep track of the event and the actors, have not been efficient enough. There is also use of better techniques to be able to visualize the different needs from the actors during the meetings. There is a risk that some influence the scenario more than others. Those different needs also include more consciousness about

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the actors and their experiences to exercise. The summarized thought from the above discussion is that there is a need for further research to be able to reach a design process that includes the participants in a more structured and empowering way. Another observation concerns the choice of events. During the GSS project there was an initial idea of increasing of the complexity of the exercise from year one to year three. This was not supported by the involved actors since they heavily argued for the importance of Keep It Simple Stupid (KISS). This should however be balanced against the fact that it is important to practice on new types of risks. One example that we have identified is to involve different type of new information medium (such as twitter and Facebook) as part of the exercises. Many actors are unused to think about those information sources as natural part of their risk response and management. But their argument that less extreme event is better to when it comes to reach learning outcomes is of course an important issue.

So, we have in this paper presented a method for how to design scenario for exercises. The method have been developed and refined during a three year project and show some promising result. There is however a need for more research, both when it comes to further development and when it comes to evaluation of the design process. There is also a need for research when it comes to design of supporting tools for this process. As concluding remarks we would like to put forward that our results also shows that there is a design challenge to design scenarios and thereby also to design a method to design those scenarios.

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