

**Expert:** Hans ten Bergen

**Title of the Session:** The application of Artificial Intelligence and Simulation in Reducing the impact of disaster and major incidents (both for training high level crisis staff as for validating disaster plans).

**Date:** 18/05/2015 to 24/05/2015

## **Summary**

Simulation using artificial intelligence is a new phenomenon in training crisis staff members and in validating emergency response plans. Both the propagation of the disaster, the impact that it has on people and infrastructure AND the execution of high level orders by the subordinate levels are replaced by artificial intelligence.

This represents not only a tremendous cost saving, but will above all allow senior crisis management members to prepare for a crisis situation in a situation that is accurately mirroring the real crisis situation. MASA Synergy also allows a reliable validation of disaster plans.

## **Context**

If your city, your region, your power plant, petrochemical site or your infrastructure would be hit by the same disaster for the second time, would your responses to this disaster be more accurate and more effective than when this happened the first time?

If you had been put in the position to manage a similar disaster before, would you now be able to reduce the impact of the disaster on your city, region, your power plant or infrastructure?

If you have seen the impact of your decisions on the evacuation of people from affected areas; if you have experienced the real timing of evacuating large groups of both healthy and injured people; if you have put the real capacity of hospitals, operating rooms and safe areas to the test once before, would you be able to save lives?

The answer to these questions is probably yes. And this is true, because you learn from earlier experiences. Lesson learned as they say.

Fortunately these lessons can be learned without having to go through all the misery, grief and devastation of a real disaster.

Today most of disaster management preparation is done through board games, table top exercises, role-plays and through the writing of emergency response plans. This is not bad, but there is a lot of assumptions and guessing involved. It is more or less all right for straightforward incidents, but not by far to calculate the impact of complex disaster scenarios. The people in the crisis cell getting trained are not put in a crisis situation that is giving a realistic representation of the disaster. They are not using the means of

communication as they would during a real disaster. And the training environment does not interact with the decisions taken and does not give them a dynamic feed-back.

Simulation using a realistic visualization can solve these problems. The values we are therefore going to add are REALISM and ACCURACY. MASA SYNERGY is an artificial intelligent disaster management simulation platform that is able to do this. It will also allow you to improve the communication between all the agencies and actors involved in a very cost-effective way.

Now, with MASA SYNERGY the people in the crisis cell can learn how to deal with a disaster or a crisis by putting them in a situation that exactly matches the reality of the disaster. This means that they are sitting in the same room as during a real crisis, they are using the exact same means of communication as during a real disaster and they will be looking at the same images as they are looking at during the real situation. No difference for them.

The real difference starts outside their range of vision. The trainees are giving their instructions to the subordinate level, as they are used to. The subordinate level however is replaced by an operator who translates these instructions into actions and activities within the simulation. The system automatically decomposes these high-level instructions into actions and activities at every subordinate level. Artificial intelligence then determines the impact on the situation and how it progresses. Operational reports from the incident area will then be sent back up through all levels of the incident organization, resulting in a new status report at the operator level, who in turn communicates the new position to the trainees and their team.

MASA SYNERGY is replacing the propagation of the disaster, the impact of it on people and infrastructure AND it is replacing the actors involved both the victims and the emergency responders and their material.

Hence there is a dynamic interaction between the instructions given and a continuously evolving situation and environment.

But what does it look like, this artificial intelligent simulation? Bear in mind that we are training people like mayors, senior crisis staff and plant managers. The theatre therefore is a map, because the people in the crisis cell need to deal with the bigger picture of the disaster. The impact of an earthquake does NOT remain limited to a single city. It has an impact on an entire region or a whole country. We are therefore not representing individuals or single vehicles, but aggregated units. The decision makers are not interested in a flat tire of a fire engine, but in the availability of an entire team. These units are represented on the map by recognizable symbols. The units act autonomously constantly providing updates about their status and the results.

Other applications than training the high level decision makers are:

Validation of disaster plans and procedures. These plans may contain a high level of words like we assume, we suppose, we estimate, we guess and even we think. And it is true that sometimes it is difficult to test, to validate these assumptions in real life. MASA SYNERGY

offers the possibility to process all these assumptions through the artificial intelligence engine resulting in a reliable and validated plan. You can also make what if analyses trying out alternative response strategies for the same incident.

Yet another application is Support for preparation of large scale live exercises. Large scale exercises are very costly, because of the high number of resources and vehicles involved. Some of these resources only participate to allow the higher level commanders and crisis staff to play their role well. The artificial intelligence can replace a part of these resources and vehicles.

The last application is Decision support. In contrast to the other applications, this is an operational one. During a real crisis all the details of the event and deployment of resources are registered in an Emergency Management System or Command and Control System. All these elements can be fed into MASA SYNERGY. Since our artificial intelligence can process much faster than the human brain, several alternative response strategies can be calculated by the system in a matter of seconds. As a result of the calculations, the artificial intelligence will come up with the outcome of these alternatives. The best one can be picked and executed.