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Computer Assisted Exercises in Crisis Management

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Abstract

Training of crisis management personnel is one of the most significant areas of Crisis Management. The use of various information technologies is one of the possible ways of supporting the training of crisis management personnel. Modelling and simulation are used as support decision-making tools in many areas. This article is focused on a description of simulation, as a one of the possible ways of support the training in crisis management, where we focus on use of Computer Assisted Exercises in the preparation of experts in crisis management. At the end of the article is given a concrete example of the use of Computer Assisted Exercises in training cooperation of the designated components of the Armed Forces of the Slovak Republic with the management elements of the departments of the Slovak Ministries.

Keywords: simulation, exercise, Cax, crisis management

Introduction

An important aspect of the education and training of experts in the field of crisis management is the need for a more intensive connection of the form of theoretical and practical education. This should reflect new challenges arising from the labor market and practice requirements. Education implemented in a practical form, during which crisis management experts and workers in the crisis management department will be directly involved in solving a model situation of a crisis phenomenon, forms a prerequisite for a better understanding of the situation that has arisen, its basic characteristics and possible alternatives for its solution, which are a prerequisite for decision-making support.

The connection of information technologies and crisis management creates conditions for more effective training of experts for solving crisis phenomena. The field of simulation technologies constitutes a great challenge within this connection and gives opportunities for elaboration and research of this issue.

Simulation in field of Crisis Management

The simulation represents the incorporation of the model into the system using appropriate inputs and monitoring the relevant outputs. It is generally considered a tool for predicting future events by solving "what if" scenarios [1]. According to Rybár et al. (2000), the term simulation can be understood as the process connected with using, already created, prepared, and verified model by the subject in dealing with a specific task [2].

One of the differences between simulation and modelling is the possibility of changing the input parameters during the simulation. Simulation is a practical and safe way to test and train in special and dangerous environmental conditions [3,4].

From the point of view of crisis management, it is necessary to focus primarily on the application of simulation technologies in teaching, training, and practical activities in all phases of the Crisis Management Cycle. Çayirci (2009) states in his publication that we recognize three basic types of simulation [3,5]:

- ***Live Simulation*** means that real people use simulated (virtual) equipment in the real world,
- ***Virtual Simulation*** means that real people use simulated (virtual) equipment in a simulated environment called a virtual environment,
- ***Constructive Simulation*** means that simulated (virtual) people use simulated

(virtual) equipment in a simulated (virtual) environment.

In addition to the three types of simulation mentioned, Rybár (2000) also mentions a fourth option, a combination of them, called ***distributed simulation.*** It enables the connection of previous types of simulation, i.e., elements of constructive, virtual, and live simulation. In this way, it is possible to connect two different simulation environments on the same map background and in the same tactical situation [2].

During a combined exercise, enemy units and training staff units are simulated using constructive simulation, while individual vehicle crews can be simulated on virtual simulators. Inputs for training crews are provided from a unified communication environment [5].

Computer Assisted Exercises – "CAX"

Exercises supported by constructive simulation are commonly used in the training of military personnel. This type of exercise is a form of exercise with computer support, also called CAX (Computer Assisted Exercise). CAXs focus on immersing participants in the environment of the situation being addressed as realistically as possible, while focusing on improving their practical skills and supporting their decision-making in solving crisis phenomena [3].

Andrassy (2018) described the Model of preparation and implementation of a simulated exercise, which is based on the model of preparation in the military sector but modified according to the requirements of crisis management. The structure of the exercise according to this model, the CAX preparation process requires a certain sequence and can be described in several steps 6]:

- formulation of the goals of the process, their concretization, clarification, and acceptance,
- selection of suitable methods and material resources,
- selection of appropriate organizational forms,
- updating adopted principles and procedures related to implemented activities,
- modeling situations with an emphasis on the creation of a unified whole,
- acceptance and assimilation of new facts,
- confirmation of acquired knowledge,
- checking the results of the implemented process.

Andrassy (2018) states that the exercise with the support of constructive simulation can be expressed by the algorithm shown in fig. 1 [6].

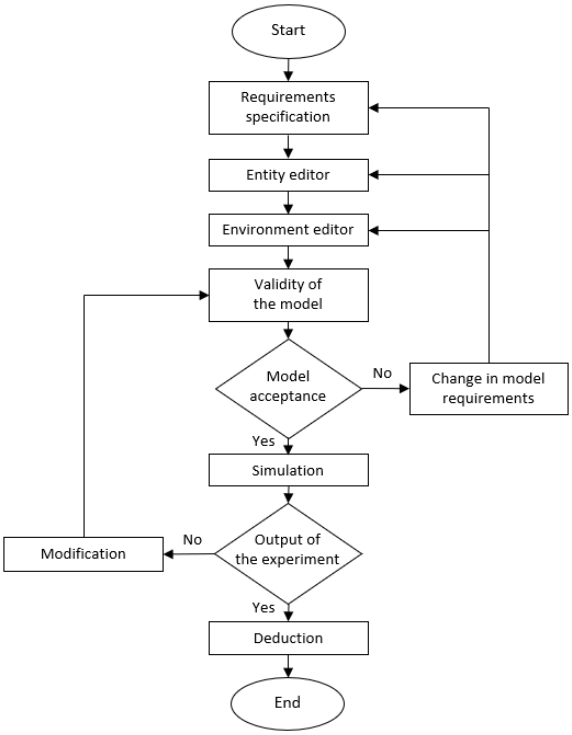

Figure 1 – CAX execution algorithm [6].

The displayed algorithm consists of several steps. First, it is necessary to create a model as close as possible to reality, which is then placed in the simulation environment. Subsequently, it is needed to verify the validity of the model. If accepted, it can be used for simulation within CAX. If the model is not accepted, it is needed to make certain changes in it and then re-verify the validity of this model [6].

The exercise with the support of simulation technologies can be divided into the following phases in terms of time:

- Exercise Planning Phase,
- Exercise Realization Phase,
- Exercise Evaluation Phase.

The Exercise Planning Phase consists of various activities, which include e.g., determination of training goals, exercise topics, exercise locations, determination of training groups, members of working groups, preparation of documentation,

preparation of a scenario, preparation of a simulation environment, etc.

The environment is represented by a digital database and entities, their roles, and structures. Depending on the exercise unit and exercise topic, the field database model is adapted. It is important that the digital database is identical to the real environment as much as possible. Visual representation of buildings, structures, entities, and models should be as realistic as possible.

Constructive simulation entities need to be defined in terms of structure and behavior according to real entities, depending on the group of trainees. This applies to persons and vehicles that would be used in solving a real situation. It is also necessary to simulate entities that are not the objects of the exercise, but play a certain role in solving the situation, e.g., demonstrators, evacuees, etc.

The Exercise Realization Phase is carried out according to the approved exercise plan in the specified thematic areas. The goal of the executive phase of the exercise is to practice realistically [6]:

- sequence of tasks within certain thematic units from a methodological point of view,
- application of procedures of individual elements and components of crisis management,
- method of drafting and submitting regulations on the method of performing tasks.

CAX-type exercises allow managers and their crisis teams to develop the skills needed to solve the crisis phenomena in the tactical, management and operational areas.

The Exercise Evaluation Phase is carried out after the exercise realization phase and during it all data and information obtained during the exercise are evaluated by a group of judges, observers, and workers of specialized workplaces.

The evaluation of the exercise is subsequently handed over to the exercising subject in the form of recommendations that should be used to improve the quality of the exercising subjects' performance and improve preparation for the next exercise.

CAX was used during the **"NEW HORIZON 2019"** exercise, an interdepartmental exercise of designated components of the Armed Forces of the Slovak Republic with the management elements of the departments of the Ministry of Defense of the Slovak Republic, the Ministry of the Interior of the Slovak Republic, the Ministry of the Economy of the Slovak Republic, and the Ministry of Health of the Slovak Republic.

The exercise took place at the Lešť Training Center and was carried out with the support of constructive simulation. The Safety Council of the Košice Region and the Safety Council of the Sobrance District were in the positions of primary trainers [7]. Figure 2 illustrate photo from the exercise "NEW HORIZON 2019".

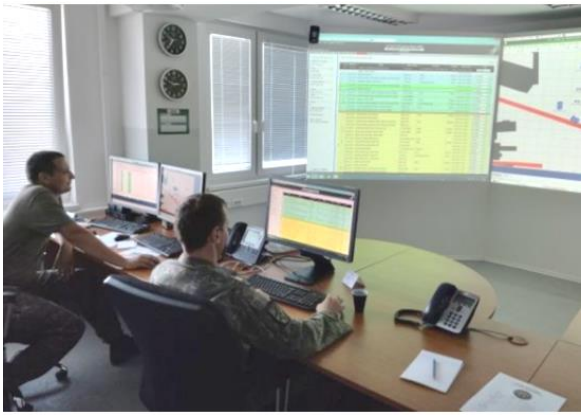

Figure 2 – The Interdepartmental exercise "NEW HORIZON 2019" [7].

The main goal of the exercise was to practice the cooperation of the designated components of the Armed Forces of the Slovak Republic with the management elements of the departments of above-mentioned ministries and the bodies of state administration and self-government within the civil-military interface in fulfilling the tasks of defense of the Slovak Republic in times of war and martial law.

As well as to verify the ability of state crisis management bodies at the regional and district level to respond to the requirements of the Slovak Armed Forces in fulfilling the tasks of defense of the Slovak Republic in times of war and martial law, and to set up processes for the implementation of the operational preparation of the transfer of the territory of the Sobrance district to the armed forces of the Slovak Republic and the processes of its return to the state administration authorities and self-government after the end of the combat operation [7].

Conclusion

The exercises with the support of constructive simulation are currently commonly used primarily in the military sphere. As an example, it is possible to cite the Simulation Center of the Academy of Armed Forces of General Milan Rastislav Štefánik in Liptovský Mikuláš and the Department of Simulation Technologies of the Lešť Training Center, which regularly carry out exercises supported by constructive, virtual, and distributed simulation for military and non-military units.

The organization of exercises in which, in addition to the Armed Forces of the Slovak Republic, also various management elements within the ministries and other departments participate, shows that exercises with the support of constructive simulation can also be implemented in civilian components of the public administration.

Computer simulations and their tools are used in the education and training of experts in various fields. The article was created to point out the possibilities of using constructive simulation in the training of experts and in the field of crisis management in public administration. I currently consider the implementation of information technologies in the process of education and training in crisis management in public administration to be a necessity and a great challenge.

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