

# A PROTOTYPE SIMULATOR OF POLICE OPERATIONS IN CRISIS SITUATIONS

Andrzej Urban and Mariusz Nepelski and Grzegorz Gudzbeler

Higher Police School in Szczytno

12-100 Szczytno POLAND

tailer@wspol.edu.pl

## Abstract

The paper presents modern perception of crisis management and its importance for security in the context of non-military threats. The paper shows the role of the police as a part of a governmental system, performing their tasks in all stages of crisis management. The article is about simulator crisis situation. The Minister of Knowledge and Higher Education gives money for a project for 2009 – 2011, for consortium Higher Police School and ETC – PZL Aerospace Industries Ltd.

## Introduction

### Necessity reasons of conducting a research – a problem situation

To guarantee the security is regarded as realization of a specific mission fulfilled by the state's executives, autonomies, community and citizens<sup>1</sup>. This mission refers to the two basic areas related to the security. The first contains the elements connected with protection and defense of 'values and national interests against the existing and potential threats', the second is related to the creation of 'internal and external conditions for free development and coping with challenges, which are carried for a nation by inconstancy, unpredictable conditions and civilization progresses<sup>2</sup>. The importance

of education for security was noticed by the European Union. One of the aims of the United Europe for the years 2007-2013 is the development of technology and knowledge due to the creation of necessary abilities to ensure the security of citizens in the scope of such threats as terrorism, disasters and delinquency, simultaneously respecting the basic human rights including the right to privacy; assurance of optimum use of the available technologies in favor of the European civil security, stimulation of cooperation between providers and users of solutions in the scope of civil security, improvement of competition in the European security sector and the delivery of research results directed to the realization of mission due to the reduction of existing shortages in the field of security. Undoubtedly the education in this range notably inscribes into the realization of the conducted research. It is not possible to provide security without proper educated personnel in that way<sup>3</sup>. Thus the state's interest is to guarantee security of its citizens and one of the subjects responsible for this issue is the Police, which is equipped with proper forces and means to eliminate the threats. Undoubtedly a necessary element of a successful action is an adequately prepared command – personnel and gaining the knowledge and abilities in commanding itself should take place during a professional training and physical participation in police operations thus in the whole decision process. The commanding issue itself has a complicated structure, presented in the further part of this study.

Commanding<sup>4</sup> police operations in the crisis situations<sup>5</sup> is based on three organizational forms of

---

<sup>1</sup> More to this topic: M. Nepelski, A. Tyburska, *Ochrona infrastruktury krytycznej*, [The protection of critical infrastructure], Szczytno 2008, p. 8-9. Compare: R. Jakubczak (ed.), *Obrona narodowa w tworzeniu bezpieczeństwa III RP. Podręcznik dla studentek i studentów*, [The national defense in creation of security in the III Republic of Poland. A handbook for students], Warsaw 2003, p. 61-62; R. Jakubczak, J. Flis (ed.), *Bezpieczeństwo narodowe Polski w XXI wieku. Wyzwania i strategie*, [Poland's national security in the XXI century. Challenges and strategies], Warsaw 2006, p. 21; J. Marczak, R. Jakubczak, K. Gąsiorek, *Obrona terytorialna w obronie powszechnej RP*, [The territorial defense in the Poland's common defense], Warsaw 2003, p. 23-45; W. Kitler, Z. Piątek (ed.), *Realizacja zadań bezpieczeństwa przez samorząd terytorialny*, [Realization of the security tasks by the local autonomy], Sandomierz 2006.

<sup>2</sup> R. Jakubczak, J. Flis (ed.), *Bezpieczeństwo narodowe Polski w XXI wieku. Wyzwania i strategie*, [Poland's

---

*national security in the XXI century. Challenges and strategies*], Warsaw 2006, p. 22

<sup>3</sup> A. Urban, *Dytaktyczne wyzwania dla bezpieczeństwa w XXI wieku. Wyzwania bezpieczeństwa cywilnego XXI wieku – inżynieria działań w obszarach nauki, dydaktyki i praktyki*, [Didactic challenges for security in the XXI century. Challenges of civil security in the XXI century – operations' engineering in the field of science, didactic and practice], Warsaw 2007, p.202, 203. More to this topic: Decision No. 1982/2006/We of the European Parliament I Cabinet from the 18<sup>th</sup> December 2006, concerning the seventh framework programme of the European Commonwealth in the field of researches, technological development and demonstration (2007 0 2013).

<sup>4</sup> §2 passage 1 Decree No. 213 of the Police Commander-in-Chief from the 28<sup>th</sup> February 2007 in the

police operations, that are interventions, actions and operations, pointing at the process within the decisions are taken, that is commanding. The presented elements of the taking decision process are closely attributed to the people taking decisions, thus commanders of interventions, actions and police operations. From the point of importance of the threats and the degree of complication of the police actions, the police operations are that kind of police actions, which are formed in case of an event dangerous for life and health of the people or their property, caused by unlawful assaults violating these goods or a natural disaster, characterized by the possibility of losing control over the events or escalation of a danger, in which it is necessary for security and public order protection to use a greater number of police officers organized in units or squads, including armed teams. The following catalogue of crisis situations is defined in police depiction:

- mass events of increased risk,
- assemblies and public ceremonies of high risk,
- blockades of the roads and buildings' occupations,
- organized pursuit operations,
- terror acts,
- collective violation of security and public order, in particular for the social, economical, political and religious reasons,
- natural disasters, which results may lead to social riots,
- other situations which may cause a danger to peoples' life and health or property and also to security and public order, characterized by the possibility of losing control over the events or escalation of a danger, where to counterattack or to eliminate them, it is necessary for security and public order protection, to use a greater number of police officers organized in units or police squads, including armed teams.

In connection with such serious events the police operations are ordered. Firstly, the ordering person will be the Police commander-in-chief, when the range of an event is bigger than the area of one Police provincial headquarter or there is more likely that such an event is possible to happen or also during operations taking place on the actual site of a Police provincial headquarter, which extend in time, and in case of a need to support the forces and means including the logistics going beyond the potential of an actual Police provincial headquarter. Secondly, the Police commander-in-chief is managing a police operation, when the range of an event is bigger than the area of one Police district headquarter or there is more likely that such an event is possible to happen or also during operations taking place on the actual site of a Police district headquarter, which extend in time, and under condition of an

increasing need to support the forces and means including the logistics beyond the potential of an actual Police district headquarter. A police operation may be ordered by the district/municipal/regional Police commander, when the range of an event is bigger than the area of one subordinated Police unit or there is more likely that such a threat is possible to happen or during operations extending in time, under conditions of an increasing need to support the forces and means not being at his or her disposal including the logistics beyond the potential of an actual Police district headquarter. The sub operations connected with different events can be lead within the confines of one operation, if they are simultaneously aimed at the realization of the main operation's target. Within the confines of sub operations the division into such sections is allowed, which are aimed at the realization of the sub operation's target and into subsections, which are aimed at the realization of the section's target. The Police commander-in-chief, the provincial Police commander and the district Police commander or their deputies and also a Police officer appointed by the one of the commanders, with a proper training, having predispositions to and experience in commanding are entitled to command an operation. In case of a division of an operation into sub operations, a police officer with predispositions and experience in commanding is being entitled to command a sub operation. The operation is realized according to a commander's operation plan. Such plan is being prepared by the chief of staff of the operation's commander and it is being approved by the operation's commander. Such operations are called planned operations. There are also operations realized in case of a sudden event, which makes it impossible to prepare a plan. The realization of such operations relies on starting an operation on the basis of an oral decision of the actual provincial or district Police commander and the immediate written confirmation as well as leading the operation according to the commander's operation plan, adapted to the nature of the event. The realization of a police operation ensues on the basis of three levels: strategic, tactical and executive. The first is attributed to the police operation commander, the second to the headquarter of the police operation commander, which is responsible for working out the commander's decision, that is supporting the commanding process, and the third to executors of the operation, inter alia to the sub operation commanders.

The constructed prototype simulator of police operations in crisis situations will be based on the presented way of operating of the police forces. The people functioning in the process of commanding the police operations will undergo a training, that are the police operation commanders, the police sub operation commanders and the people working at the headquarter of the police operation commander. The training, reflecting the stages of the commanding process, will consist of three parts: preparation, realization and reconstruction stage.

---

matter of methods and forms of preparation and realization of Police tasks in case of a threat to people's life, health, their property or public order and security.

<sup>5</sup> Ibidem, §2 passage 6.

The functioning essence of the prototype will be a simulation of processes not only connected with taking decisions (tactical and strategic) but also reactions of the virtual environment to an arising situation in the police and non-police context. The construction of the detailed behavior algorithms (decision trees) and their implementation in the system on the basis of the existing legislative solutions as well as experts experience in the field of Police operations in crisis situations and also methodology of teaching, connected with the existing technical solutions at the market as well as creation of the new more functional ones, will enable the complete functioning of the simulator.

### **The description of the innovative solutions of the prototype simulator of Police operations in crisis situations**

Operations associated with the implementation of the project will, above all, relate to thematic areas concerning software engineering, knowledge and decision support, designing of specialized systems, computational sciences and creating scientific databases. The designed simulator will be a specialized system using the resources of interdisciplinary character. The created solution will realize all tasks in the field of simulating and presenting incidents in virtual environment. The modelled objects will be built according to the real objects' parameters. Each object will have predefined features concerning the appearance and the possibility of interaction with other objects. Such environment will enable simulating of most of the incidents occurring in the natural environment with the possibility of observing their consequences. Furthermore, modern solutions will also be applied in the field of artificial intelligence and its quality and efficiency will be defined in the real time simulation of objects' reactions of different characteristics. Additionally, the solutions concerning the presentation of the incidents will allow to analyse and define the principles of implementation of information acquisition using such solutions as CCTV and correlation between the quality of such solutions and the quality of decision processes in crisis management.

The simulation models used in the system will be created using statistical data gathered by the Polish Police as well as the experts' knowledge in the fields of police sciences who will prepare analysis for each of the realised stages. The gathered information resources will be used in the teaching process of implemented module of artificial intelligence. The sets of standard scenarios and role-playing which are being prepared, will be supervised by an instructor – a teacher conducting the training. The instructor will additionally have the possibility of modifying the scenario or generating new incidents. It will give a possibility of creating different decisional situations basing on one scenario. In addition, using the possibility of modification of the whole environment the leader will be able to make changes in the weather conditions. The scenarios can be joined and

role-played in the real time, which allows to fully calculate the level of difficulty of the task implementation. The people being trained will have all the possible information sources and appropriate resources (forces and means) necessary during the preliminary activities in the training. Decisions taken by the trained persons will be based on more or less complete information according to the scenario and dispositions. The system will be able to simulate municipal CCTV network, industrial CCTV network, mobile CCTV centres and other information sources. In the given situations the trained person who is making the decision, thanks to the system, will be able to go to the scene of the incident in the virtual environment to command directly from the scene of the incident. The possibility of using information sources will depend on many different factors (weather conditions, simulated breakdowns, catastrophes) modified by the instructor conducting the training.

Many participants will be able to take part in the training at the same time and the number will only be limited by the number of operating stations designed in the system. The participants of the training will realise the tasks on two levels of commanding – strategic and tactical. According to the level the participants will receive appropriate information from the system and they will also manage the means and forces appropriate for their position in the structure. The solution will be fully flexible – changes in the structure, organisation of commanding and responsibilities of services will not affect the functioning of the system, and simulations will be instantly adapted to the new requirements. The structure of the conducted training will determine specific roles for all of the participants. The organizer of the training will have appropriate personnel resources, such as instructors responsible for the whole training process, supported by the administrator of the system and its operators, who will play the part of the persons fulfilling dispositions during the practice session. Communication will be executed using the appropriate means of communication. The exchange of information between the trained (cooperating forces) will be executed using advanced means of digital (trunking) communication system TETRA. The number of operators in the training will depend on the number of trained persons and the level of difficulty of the implemented scenario. Such solution will cause that the people trained will not have to get familiar with the applications not present in the unit they represent. The trained persons will get the knowledge strictly concerning the training programme in the field of crisis management and will develop the ability of its implementation.

The system will allow training in the situations very similar to the real ones and also provide an instant assessment of the ways of managing by reactions of the virtual environment on the decisions taken. It will cause that the trained persons will feel the pressure of the environment and observe the results of their accurate and wrong decisions. The level of the training

conducted using such methods will be very high and will include all the aspects of operations in real situations.

Creating of the simulator prototype will allow to illustrate the operations implemented by the police in terms of crisis events from the point of view of the police, which strictly relates to Order 213/2007 of Chief Commander of Polish Police from 28 February 2007 concerning methods and forms of preparation and implementation of police tasks and public order, which describes the commanding system in the situations mentioned above. During the training the simulator will also allow to check the knowledge and skills which are based on and crisis reaction procedures, dispositions concerning coordinating and cooperating activities scattered in different legal acts.

Students of the Higher Police School in Szczytno as well as training participants will be able to use the police operations simulator in crisis situations, within the framework of the curriculum. Training of the decision making processes will be supported by multimedia which will allow identification of errors and gaps in the plans of the police operational commanders and crisis reaction plans. They will enable education of managing (especially commanding) forces and means by the police and other forces and institutions of paramilitary character and also promote activities' self-control and immediate reaction to mistakes made in the process and also how to work in a team. Properly prepared didactic decision game on the tactical and strategic level perfectly simulates operations in real conditions and allows to develop skills of creative solution seeking and making quick decisions, comprehension and joining cause and effect relations, and also stress resistance.

Improvement of the managing (commanding) process in crisis situations by the police will be executed by implementation of decision games on the tactical-strategic level supported by multimedia decision training. The aim of the training will be improvement of police officers' practical skills (commanders of police operations and their staff) in the field of executing their responsibilities as commanders, and above all, organizing of cooperation and coordination of the activities of all functional subjects (teams) of staff, in order to calculate the data and different variants of activities necessary for the commander to make a decision. The essence of the decision training will be practicing of particular staff activities according to the valid procedures concerning selected crisis situations in terms of police activities on the level of commander of the police operation, in order to rationally execute the tasks of their staff, to achieve desired level of captured knowledge demanded by the particular tactical or strategic situation. The substance of the decision training will be gathering, studying and analyzing of data (information) by the commander of the police operation, making operational calculations (tactical and strategic), varianting of different ways of using force and means, developing planning documents, executing

operational tasks in the virtual terrain in the field of organizing and realization of commanding, activities synchronization and improvement of skills concerning the use of technical means of commanding and communication. Furthermore, on the basis of the created system, there is a possibility of creating innovating organizational and technical solutions with the object of educating forces other than the police.

## **Conclusions**

The final result of the scientific research will be a police operations simulator in crisis situations functionally directed at improving of managing (commanding) process in crisis situations by the police, especially by implementation of decision games on the tactical-strategic level, supported by multimedia decision training. The created system will be designed for simulating of physical phenomena in artificially created environment. The proposed solution will be an computer system which executes tasks both in the field of simulating and presenting incidents in virtual environment. The modelled objects in the simulator will be built using the parameters of the real objects. Each object will have its own predefined features concerning its appearance and possibility of interaction with other objects. Such environment will allow to simulate most of real incidents with the possibility of observing the consequences of their occurrence. All adjacent objects will react in the way determined by algorithms in each particular incident occurring in the system. The modelled objects will include trees, buildings, vehicles and people. The system will be able to simulate behaviour of both services on the scene of incident and incidental witnesses, as well as injured persons. The picture generated by the system will be based on the most recent solutions and will utilize the possibilities offered by modern graphic cards. This will cause that all of the presented objects and situations seen by the users of the system will be very accurate and can be recognized as the view from the real picture source, as in case of industrial or municipal CCTV. The simulator will be an ideal place to execute incidents' simulations, which can be specially difficult in real environment, due to organizational reasons.

In the future the designed technical and organizational solution can be used by other services responsible for public security. The action plan includes preparing models concerning characteristics of most of the services responsible for public security in Poland. It means, that implementation of this solution in the simulation of activities of other services will be much less time consuming. In practice, it comes to ready-made modifications or developing new scenarios. Additionally, the solution will be fully modifiable and scalable, which will make it easier to accommodate for the further users.