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Historical-pedagogical analysis of model and simulation development as a part of tactical training of military professionals

The main mission of the Ukrainian Armed Forces is to defend its own country. No one but soldier can do that job better. Real soldier preparation requires rigorous effort. Currently, the financial situation in our Armed Forces is not adequate and cannot always support the preparation of such professional officers and soldiers. Simulations provide a means to train leaders without deploying all of the soldiers to the field. This saves money. The capacity to repeat events in simulations allows a cycle of plan, execute, AAR, and retry.

There are already established and functioning education systems using simulation of actions at tactical and strategic levels in some national Military Higher Education Institutions. There are established Simulation Centers in the National Defense University of Ukraine (Kiev) and Hetman Petro Sahaydachnuy Ground Forces Academy in L'viv. Both institutions are equipped with American desktop simulation software such as „Follow Me”, „Battle Command” and „JCATS”. Computer training software is the simulation of various conflict situations on the ground, in the air and on the sea at different command levels from individual soldier to squad and army corps level with up to 5000 people in it. These simulations run over a computer network installed in the training classrooms. The operational situation simulated is as realistic to a combat situation as possible. During their professional training, military experts consider hundreds of different parameters in great detail such as terrain, individual building layout, weather conditions, duration of daylight hours, engagement of different weapons and weapon guidance systems.

Psychological, pedagogical and didactic conditions of computer based training process has been researched under many aspects: the use of computers in education process (Krasnopoloskiy V.E., Martyshok O.S., Melnikova Z.A., Siveystr A. M. etc.); development of computerized textbooks and software (Gruzyn L.E., Ivasyk V.B., Lupan I.V., Makoed N.O., etc.) development of computer (Babela O.Y., Vityuk O.V. and others) and information technologies (Dubov T.V., Zayceva T.V., Klochko V.I., Mulyar V.P., Smalko O.A. and others); use of computer simulation (Levina I.A., Pinkas V.G., Teplickiy I.O. and others).

Works of the following American authors Kelton V., Law A., Maggie M., Shannon R., Savory P., Taylor G., Depui T., Willson A., Ballis G., Tock A., Kahn G., and Mann I. on problems of models and simulation in the education process of military professional are of interest for our research [Magee 2006; Tolk 2012; Shannon 1975; Ситник 1999].

However, national military pedagogical research has not analyzed the development of models and simulation of tactical and strategic actions as a part of professional military training in an historic and pedagogical context.

Thus, our goal is to conduct short historic and pedagogic analysis of development of models and simulation of tactical and strategic actions as a part of professional military training.

Models and simulations have a long military history. The earliest models consisted of little more than lines drawn in the sand, with objects such as stones and twigs used to represent terrain features. Despite their simplicity, these early models served the same purpose that more advanced combat models serve today, that is planning and analysis, mission rehearsal, and After Action Review [AAR].

It is a common belief that the history of models and simulation begins with the appearance of strategic desktop games such as chess. According to some historians *Chaturanga* – a game resembling modern chess – appeared in V century B. C. And it is believed to be the first game model of tactical and strategic actions. Throughout the centuries, game grew in size and complexity.

At the end of 17th century on the territory of modern Germany the *Kings Game* was used to train royalty in the art of war. In 1664 Veichmann K. introduced his variation on chess, it was played on an enlarged game board with 30 pieces per side representing king, marshal, colonels etc. In time, the game pieces evolved to represent aggregate forces (military units).

At the end of 17th century in Prussia game terrain boards increased in size to 1666 squares with color-coded terrain features (e.g., water, marshes, forests, buildings, mountains etc.) and with 120 pieces per side including fortification buildings and trenches. The game gained significant success in training officers for combat actions.

The German game *Kriegspiel* improved in 1811 is an example of the new class of wargames to surface during this period. In the late 1800s *Kriegspiel* was moved from the sandbox to the map board, and rules were adjusted to more accurately reflect Germany's experiences in the Prussian-Austrian war.

Models and simulation software became attractive and development began in many countries, however, the first country to initiate profound research in this sphere and to use simulation software in training of military professionals was the United States. This country still remains the leading country in simulation at tactical and strategic levels. The huge potential achieved in this sphere is being rigorously analyzed on other advanced countries.

Military researcher William Roscoe Livermore modified *Kriegspiel* to include tracking of consumables and human factors like fatigue; his book „Ameri-

can Kriegspiel" (1898) is cited as the first U.S. contribution to wargaming. The U.S. Army adopted British and German wargaming techniques in 1879. Both continued to refine and use dual, tactical, and strategic board games through the end of World War II (WWII).

Before entering WWII, the U.S. Army conducted a series of live wargames, for the express purpose of preparing American forces for possible involvement in Europe. These exercises, which integrated tanks with cavalry and infantry units on a simulated battlefield covering most of the southern United States, allowed Army strategists to test the effectiveness of conventional defenses and armored attack, and to identify and fix troop supply and reconnaissance problems before the U.S. entered the war.

In the mid 20th century models and simulation became an integral part of all chains of command of U.S. Armed Forces as a realistic computer tool to describe process, system or event. For many decades models and simulation remains to be one of the few priorities as a tool of enhancing the effectiveness of training and use of U. S. Armed Forces.

Literature

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Abstract

We have provided a short description of development of models and simulation of tactical and strategic actions in training of military professional. We believe that better and more rigorous research of development and new trends of models and simulation is needed in order to gain the necessary knowledge on how to use their experience in development of perspective systems of models and simulation of combat actions for Ukrainian Armed Forces. This is especially true for the training of future officers in Military Higher Education Institutions.

A further line of research may be the analysis of development of national models and simulation of various actions in military sphere, particularly in system of military education.

Key words: simulation and modeling, imitation, modeling, simulation, model.