

War game as a method of training – as a method of analysis

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Abstract: The purpose of the article is to present the development of a new simulation tool Superior Degree Demonstrator, which is intended to introduce the issue of fire support to students of the military college in a game-like manner. The simulator is intended primarily for the purpose of preparing future artillery officers at the Department of Fire Support of the University of Defence, which is directly involved in its development. At the same time, it aims to awaken in the younger generation of students a proactive approach to study. However, it can also be used as an objective tool of combat effectiveness analysis within the framework of the army acquisition programs.

Keywords: simulation, fire support, military training, combat effectiveness.

1. Introduction

Military exercises are an indispensable part of the training of members of the armed forces, which, in addition to their benefits, also entail a number of negative aspects. In particular, they involve economic costs, risks associated with threats to health, life or property and, last but not least, they can also have a negative impact on the environment. These negative impacts of the training can be largely eliminated by the effective use of currently available technologies in the form of simulations and trainers.

The advantages of simulation and trainer technologies are also shown in terms of making studies more attractive. The presented simulation tool Superior Degree Demonstrator (SDD) builds on the gamification of military college study using computer games such as Counter Strike and Battlefield or simulator Virtual Battle Space, which were implemented in the past at the university. Such a form of teaching has demonstrably not only professional benefits, but above all, it is a way of teaching that can be very attractive especially for soldiers of the younger generation.

2. War game

The preparation of members of the armed forces using the game principle is referred to as the War Game. NATO Alliance publication AAP-6 (2021) defines the war game as a simulation of military activity by any means using specific rules, data, methods and procedures. The war game is primarily carried out for the purpose of selecting the optimal variant of the solution of the tactical situation and its possible training based on the available forces and means. Within the war game variants of the solution are created, their consequences are assessed and based on them the best option is selected or certain measures are taken.

For this purpose, a number of simulators have already been created and are also used by the Czech Army. However, a number of simulators, which the Czech Army possesses, deal only with the overall tactical situation on the battlefield with a focus on combat units and they miss the specifics of using combat support units. It is for this reason that the University proceeded to the acquisition and development of a new military simulator with a focus on fire support.

The issue of fire support includes, in particular, the control and coordination of ground and naval artillery and close air support for the benefit of its own combat units. In a very simplified way, this process can be imagined as the work of an air traffic controller at an airport, who is subject to similar requirements in terms of safety and efficiency. It is essential that the military personnel responsible for this activity have adequate training. Such roles are dealt with in the original research at the university (Nohel et al, 2022).

3. Methodology

Software development was preceded by the evaluation of experience with training and simulation technologies used in the past at the department. At the same time, the current available simulation software, which the university possesses, was evaluated, especially MASA Sword by YTEK company. A literature analysis was also carried out with a focus on application areas of the research carried out at the university and its implementation into the software was evaluated.

At the moment, the simulator is still in the software development phase. Nevertheless, it was intentionally delivered to the department at an early stage of development in order to take into account its effective progress in a specific direction that is required by the University. Qualitative research methods, such as brainstorming or narrative interviews with fire support experts collect data for further development of the simulator in terms of potential teaching benefits. Similarly research is carried out with students, but in terms of "entertainment side" of simulator which is taken into account in the development as well.

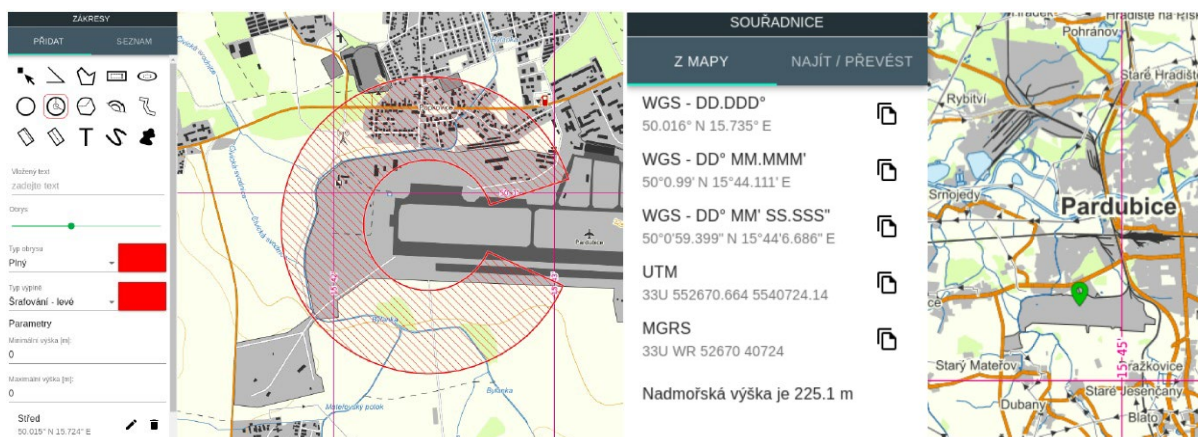
4. Superior Degree Demonstrator (SSD)

The Superior Degree Demonstrator is one of the simulation tools of the war game currently being developed directly by the Department of Fire Support of the University of Defence. The main task of this new military simulator is to provide an attractive form of presentation to students of the military college on the issue of the combat use of artillery. The SSD tool consists of a server on which the RePlan software application is located and any number of wirelessly connected computers on which the application subsequently works.

The university cooperates with the company RETIA, a.s. on the development of this simulator and the name of RePlan software is derived from the name of company. The company has long cooperated with the Czech army in the field of research and development of defence technologies with a focus on, among other things, radiolocation means or command and control systems.

4.1 Method of training

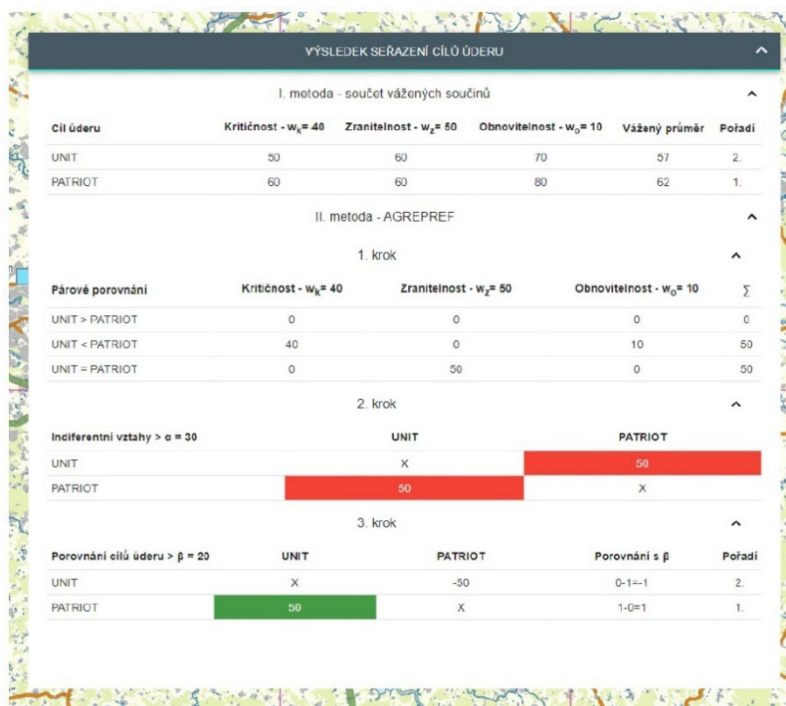
The software application RePlan has the ambition to become a comprehensive 2-D fire support simulator, which currently works with a number of geographic products with high resolution. These are raster maps, vector and elevation data for the whole territory of the Czech Republic, which allow a number of analyses through the available tools. Basic map tools allow students to work with the map base, measure distances, areas, read coordinates in a number of defined NATO formats. Movement issues are related to various research activities at the University (Vlkovský et al., 2021).



Another current benefit of the RePlan application is the drawing of tactical icons according to the standardized NATO symbolism and their management within tactical situations. The simulator allows to add units that interact with geographic layers. This allows to perform terrain analysis for deployment of units, radar or weapons range analysis based on visibility due to the terrain. Within the artillery is also useful terrain profile analysis for detecting obstacles on the flight path of the projectile, for determining artillery fire data. The RePlan application further allows battlefield analysis from the perspective of targeting. The icons of enemy units can be marked as targets of the strike and according to their characteristics, the RePlan application evaluates these targets in terms of priorities and order of elimination.



The current state of the simulator allows for training of students in working with electronic map in command and control system in unclassified mode, choosing the right units and relevant tactical icon. From the tactical point of view, it allows training in filed survey and emplacement of units, as well as plot of combat formation or intelligence preparation of battlefield or issuing of operational orders. To a limited extent also coordination of fire support from the position of fire support officer. That means of tracking own or enemy units, observe safety distances during a firing missions or prioritization of targets.



Graduates of the military university take up command and staff positions that form the core of the military command and control system (C2). For this reason, it is necessary, among other things, to familiarize them with the principles and algorithms of C2 systems before coming into practice. C2 systems are operated in a classified mode in the environment of the military and the DNS tool thus allows work with these systems in a non-classified mode (Šilinger & Blaha, 2017).

The future intentional state is to create a complex simulator similar to MASA SWORD, which does not have a sufficiently elaborate issue of fire support. This means to allow complex interaction between units of own and enemy. Furthermore, automatic or automated evaluation of tactical situations depending on the set parameters. From the point of view of attractiveness for students, it seems like a prospective competition between students. From the point of view of the quality of the evaluation of situation by students or even simulation of combat activity between them. As well as their cooperation in the combat and coordination of fire support and possible

involvement of virtual reality. From the pedagogical point of view, it is intended to create standardized operational scenarios on which students' knowledge and abilities will be tested in terms of speed and accuracy of decisions.

4.2 Combat Efficiency Analysis Method

Based on the possibilities of simulation tool in creating and evaluating war game scenarios, a secondary but equally important function of the SDD tool can be identified. The war game method serves primarily to select the optimal variant of the operation solution based on input parameters. Applying this principle offers the function of the simulator to analyze effectiveness of the combat formation based on available or allocated means. The input parameters of the simulation can be adjusted e.g. in terms of the quantity of units, armaments, their capabilities, etc. and the results can be compared. The initial results of the research have already been published (Blaha & Potužák & Šilinger 2018; Ivan et al., 2021).

In the same way, it is possible to change the input parameters in the sense of changing the combat devices to those that the army does not currently possess and monitor their influence on the course of the operation. Such a way of measuring efficiency based on the given parameters of the evaluated devices enables evaluation of new acquisitions and verification of the effectiveness of their purchase. It should be noted that the combat activity is a stochastic process into which a large number of variables enter, and the results of the simulation are always dependent on the quality of the simulator processing.

5. Conclusion

The battlefield is constantly evolving, both in terms of the accelerating pace and in terms of the spectrum of means and systems used. For this reason, there are also higher requirements for members of the armed forces, which the university must take into account in the preparation of future army staff. The issue of combat or fire support evolves with each conflict and it is therefore necessary to maintain the pace of this development not only in terms of systems and means, but also in terms of the preparation of members of the armed forces responsible for this area. Experience from the preparation of the current generation of students of the university indicates a lack of a proactive approach to study. These reasons lead to the implementation of presented simulation tool SSD which can serve not only for training purposes but can be used for evaluation of course of action as well.

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