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A. Holovnia

V. Bilinets

S. Bielov

SUBSTITUTION OF THE THEORETICAL PROVISIONS OF USING THE WARGAME UA PROGRAM IN THE PROCESS OF PROFESSIONAL TRAINING

The significance of using interactive software tools for simulating battle management processes in the training of tactical-level commanders (squad, platoon, company) is substantiated. The article outlines the factors that influence the effective integration of the Wargame UA software into the "General Tactics" training module, including technological capabilities, instructor qualifications, and the requirements of modern military professional training.

The advantages of the software in terms of the creation, development, and execution of tactical scenarios, planning combat operations, enemy fire engagement, and simulation of unit cooperation at various levels are analysed. Key limitations of the software's use are identified, such as the difficulty in replicating psychological factors in combat simulations and the requirement for a sufficient level of digital literacy among trainees.

Recommendations for improving the program's functionality through mobile application integration, expanding scenario libraries, and synchronized task execution by multiple user groups are developed. The article demonstrates the prospects for the further development of interactive programs like Wargame UA to enhance the effectiveness of professional training and adaptation to contemporary challenges in the field of operational control.

Keywords: *interactive software, security and defence forces, combat simulation, professional training of military personnel, unit coordination, combat planning, analysis of combat operations.*

Statement of the problem. Modern warfare is characterized by the rapid increase in complexity of combat operations and high dynamics of the battlefield environment. Under such conditions, traditional training methods based on theoretical knowledge and classical practical training, without the integration of technological solutions into the learning process, are becoming less effective. The ability to conduct battle management plays a crucial role for commanders, as it determines operational effectiveness, synchronization of units' actions, and achievement of mission objectives. Through the implementation of the Troop Leading Procedures (TLP), commanders obtain a standardized approach to mission preparation and execution, ensuring consistency in decision-making. During the battle management phase, plans developed in the preparation phase are executed and adjusted in real time in response to changes in the operational environment. This phase requires the commander to ensure stable communications and control, maintain coordination with adjacent units, and adapt quickly to the evolving environment.

Simultaneously, modern military professional training faces numerous challenges related to the transition to digital technologies. Information saturation, the need to process large volumes of data in real time, and emerging threat types require commanders to be capable of responding appropriately and efficiently.

Analysis of recent research and publications. Modern military research actively explores the use of interactive software for simulating combat operations in the training of commanders and command-and-control bodies. Their role and development are highlighted in the works of I. V. Barkatov, V. P. Varakuta, V. S. Farafonov, V. O. Tiurin, S. S. Honcharuk, A. A. Lozko [1], I. T. Skrypchenko, K. A. Markechko, O. T. Skrypchenko [2].

In particular, in publication [3], the authors analyse the use of the JCATS simulation system for training at the battalion/brigade level, emphasizing its role in developing decision-making skills under operational conditions.

Meanwhile, L. A. Zaika, O. V. Lavrinchuk, and V. O. Krainov [4] investigate trends in the development of information and communication technologies in the military sector, focusing on the implementation of simulation modelling in the practical training of military command and control bodies.

Internationally, these systems are viewed as effective tools for analysing ground and naval intelligence operations and for developing new combat tactics. Further development of this research area is presented in publications [5, 6]. In particular, study [7] highlights the importance of expanding the role of war games in military education for the professional training of naval personnel and marines. The referenced sources mention the development of the VBS4 software product [8]; however, its implementation requires specialized equipment, financial resources, and IT specialists with appropriate expertise.

However, despite considerable progress in this field, there remain unresolved issues regarding the integration of such software into training modules, their adaptation to the specific nature of modern warfare, and the enhancement of their functionality to reflect realistic scenarios. Notably, the use of specific software such as Wargame UA in the paradigm of professional military training remains insufficiently studied. This presents a research gap for further analysis of the effectiveness of such software in personnel training and the development of recommendations for their implementation and improvement.

The purpose of the article is to justify the necessity of implementing the Wargame UA interactive software for simulating battle management processes in the system of professional training of military personnel, to analyse the software's functional capabilities and to develop recommendations for improving the quality of the educational process and adapting it to the current challenges of conducting combat operations.

Summary of the main material. The integrated electronic environment enables the creation of conditions close to real-life scenarios through the use of interactive platforms for simulating combat operations. However, the implementation of such technologies requires consideration of the needs of military education, the available resources, and the practical realities of war.

One of the effective solutions to enhance officer training is the development and use of software products for simulating the battle management process. The Wargame UA program is a digital tool that not only facilitates the execution of combat scenarios but also allows for dynamic analysis of their implementation in the course of the war game. It is integrated into the educational process as a logical continuation of the battle planning phase, enabling the practice of command and control skills based on acquired knowledge and competencies.

According to the systemic-activity approach, the procedure for using such a program to simulate battle management is based on standardized methods outlined in doctrinal documents [9, 10], their adaptation to a digital environment, and a creative component reflecting operational conditions and the specifics of combat experience [11]. In line with the principle of systematization and consistency, the program enables the implementation of professional military training components based on the steps outlined in the TLP, while also fostering the development and refinement of real-time command and control skills.

Integrating each step of the TLP with the program's functionality allows commanders to improve their practical skills from mission receipt to the execution of the final decision. The program reproduces these stages by simulating realistic scenarios with visualized combat operations and their dynamics. This allows all stakeholders to conduct a detailed analysis of each step and understand the interconnection between various phases of combat operations.

A key component is the use of the METT-TC (Mission, Enemy, Terrain, Troops, Time, and Civil Considerations) planning algorithm [12]. This protocol is integrated into the program and reflects the most influential factors affecting decision-making in battle. Users can simulate various scenarios by changing situational parameters, which makes it possible to assess the effectiveness of the decisions made depending on the specific circumstances. This not only reinforces theoretical knowledge but also develops commanders' practical skills.

The main methodological advantage of Wargame UA is its ability to integrate with existing curricula. It serves as an additional tool to enhance learners' capabilities in practical applying acquired knowledge and skills. For instance, based on the material studied on general tactics training, the program enables the simulation of scenarios involving the formation of combat formations, execution of manoeuvres, and management of available forces and assets. In military topography, it can be used to simulate terrain

orientation and digital map handling. Thus, the interactive program provides a comprehensive approach to learning, supporting interdisciplinary tasks within a unified educational framework.

Particular emphasis is placed on interactivity in the learning process. Using the program makes it possible to create conditions as close to real-life combat as possible, encouraging future commanders to improve their skills in issuing orders (combat directives) under complex situations. This fosters rapid situational assessment, stress-resilient decision-making, and real-time unit management. Moreover, scenarios can be adjusted during mission execution.

Thus, using the program makes it possible to increase the training efficiency and develops essential practical skills necessary for unit command in combat. To fully understand the benefits of Wargame UA, a more detailed examination of its description and the characteristics of its components is required.

This software product is a modern system for simulating combat operations, reflecting the realities of contemporary warfare with maximum alignment to the tasks faced by the security and defence forces. The program's primary purpose is to provide interactive battlefield visualization using a wide array of tools for analysis, planning, action, and, ultimately, training. Thanks to its intuitive interface and compatibility with various devices, Wargame UA is a universal solution for professional military training that meets modern standards.

The program consists of integrated components such as a dynamic map, a tactical symbol constructor, detailed specifications of infantry units and vehicles, and modelling of modern combat means such as Electronic Warfare (EW) systems and Unmanned Aerial Vehicles (UAVs). The dynamic map offers realistic tactical situation representation, enabling the simulation of unit movements and changes in combat positions.

One of the most distinctive advantages of Wargame UA is its accessibility. The program operates in a web browser window, making it usable on personal computers, laptops, tablets, and smartphones. Such versatility eliminates the need for expensive specialized simulation equipment. Standard devices and a microphone are sufficient for effective use of the program, significantly reducing implementation costs and making it available to a wide user base.

The functionality of Wargame UA is aimed at ensuring a high level of detail and realism in combat simulation. One of its core features is the ability to display the tactical situation on a digital map using symbols that dynamically represent information about movement (real-time or planned), infantry positions, vehicles, and other assets. Users can move these symbols across the map, merge or split units, simulate their embarkation onto vehicles, indicate sectors of fire, firing trajectories, as well as determine the range and grid azimuth of fire (Figure 1).

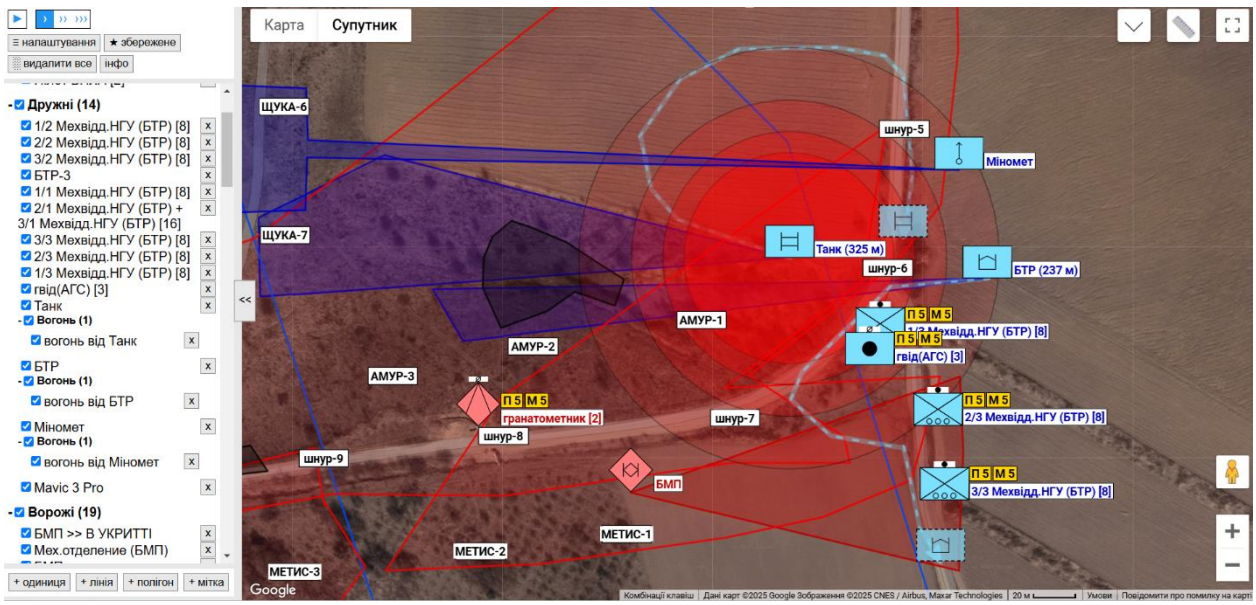

Figure 1 – Platoon attack on enemy position and operation of a dome-type Electronic Warfare system

In addition, the program's functionality allows for the consideration of individual parameters for each servicemember, including their weaponry, training level, moral, psychological and physical condition, as well as their duties within the unit (Figure 2).

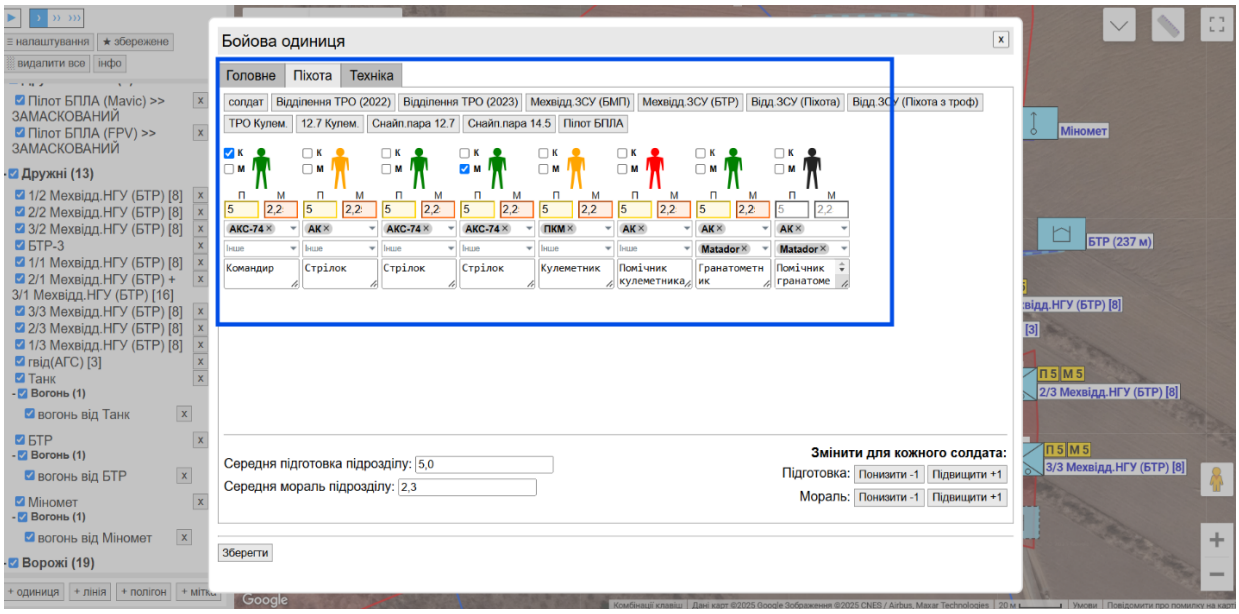

Figure 2 – Infantry unit editing tab

The tactical symbol constructor allows users to create detailed markings for tanks, vehicles, artillery, etc., and to designate sectors of fire, concentrated fire zones, and directions of attack. For mobile combat systems, the program considers the status of key modules such as chassis, hull, turret, and weapons. It also enables logging of typical incidents such as damage, malfunction, bogging down, or loss of ammunition, and more (Figure 3).

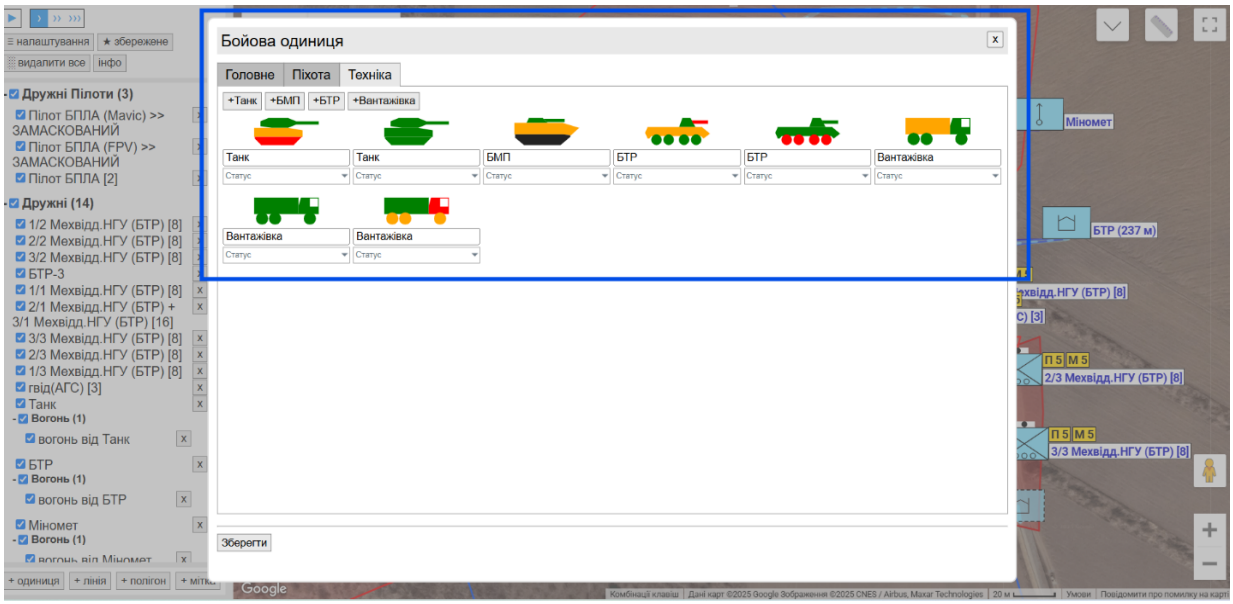

Figure 3 – Combat vehicle unit editing tab

The UAV functionality deserves special mention. The program supports modelling of quadcopters and FPV drones. Quadcopters can carry payloads and perform "drops", taking into account wind direction and speed, which affect strike accuracy. The payload weight is automatically calculated by the program and reduces flight duration. FPV drones can be equipped with various warheads (fragmentation, thermobaric, shaped-charge, etc.), track targets, and conduct attacks. The software also takes into account the drone's battery charge level, flight time, and the possibility of auto-termination of flight in case of low battery (Figure 4).

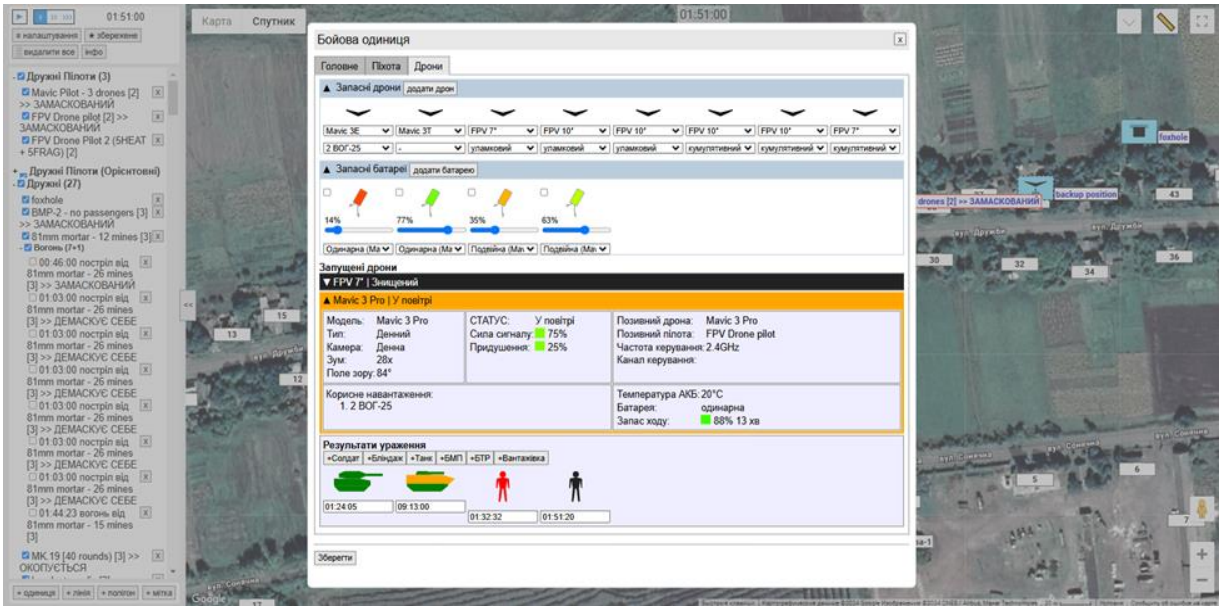

Figure 4 – Unmanned aerial vehicles combat unit editing tab

Additionally, the program allows modelling the effects of dome-type EW systems on the map, allowing users to simulate its impact on UAVs, communication, and control systems of both enemy and friendly forces. This functionality makes the program highly relevant for training in modern warfare (Figure 1).

To support the organization of the training process, the program includes TLP tools and access to the METT-TC protocol, allowing the consideration of terrain, available forces and assets, mission, and time (Figure 5).

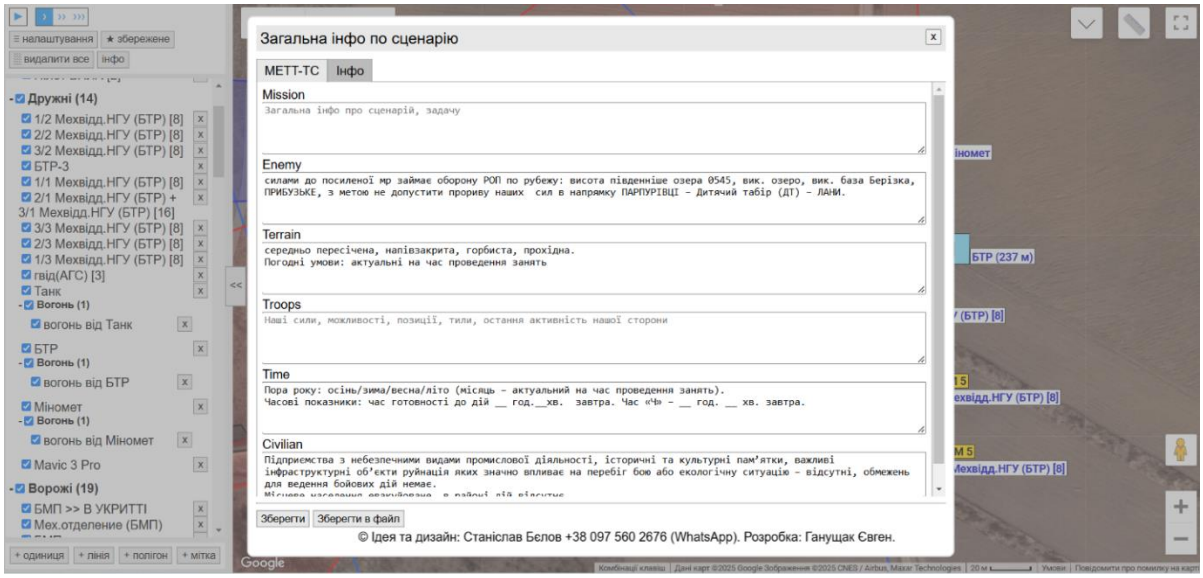

Figure 5 – METT-TC protocol editing tab

Instructors can use time management tools (including accelerated time), create missions, leave notes, and import/export scenario files. This structure supports the development of complex, realistic training scenarios.

Wargame UA program opens extensive possibilities for interactive learning, analysis of combat operations, and tactical skill enhancement. Its primary areas of application include ensuring a high level of professional training for commanders, improving battle planning, and conducting detailed analysis of combat episode outcomes. These areas address the current needs of the security and defence forces and meet high standards of military professional training.

Let us take a closer look at the key advantages of using Wargame UA program.

1. Planning combat operations and their possible developments, forecasting enemy actions. Thanks to the program's ability to model the tactical situation in detail, commanders can develop courses of action, test their effectiveness, and adjust tactics while considering enemy behaviour. Tools for marking positions on the map, defining sectors of fire, and simulating unit and vehicle movement help build realistic scenarios. Users can evaluate multiple courses of action, test their plans, and adjust them in response to changes in the operational situation. This significantly enhances the quality of battle planning and helps identify potential risks before real engagement.

2. Training commanders at squad/platoon/company/battery level (with the prospect of expanding to battalion/division level) in combat operations. Training is conducted through the simulation of typical combat situations. The use of the program allows the scenario execution process to be carried out through the following options:

– the instructor works individually with the trainee (instructor assumes roles of senior commander, enemy, subordinate units; trainee acts as commander);

– the instructor works with each trainee in turn following a pre-established sequence, while the rest of the group observes and conducts real-time analysis (instructor assumes roles of senior commander, enemy, subordinate units; trainee acts as commander);

– the instructor works with a subgroup of trainees, assigned to a specific role within the scenario, while the other subgroups may observe and analyse the scenario execution (instructor assumes roles of senior commander, enemy; trainees act as commander, subordinate units);

– the instructor acts as a facilitator of combat interaction between two opposing sides, following the principles outlined above (instructor assumes roles of operational environment moderator, subordinate units; trainees act as commanders of both friendly and opposing forces).

3. Visualization of the commander's decision, enabling analysis of the outcomes of each step in the TLP. The program can be used to integrate training with real-world combat situations, allowing commanders to test their decisions in a virtual environment before applying them in practice. This not only reduces risks but also increases commanders' confidence in their actions. Thanks to its ability to tailor scenarios to specific training needs, Wargame UA serves as a flexible tool for preparing both novice and experienced military personnel.

4. After Action Review (AAR) is conducted separately once a scenario has been completed. This crucial element of the training process enables an in-depth examination of the actions taken, identification of successful decisions, and analysis of the causes of mistakes. The Wargame UA software allows for the recreation of the chronological sequence of combat events, visualisation of unit and equipment actions, and consideration of factors that influenced the outcome. Its tools make it possible to save combat episode scenarios for further analysis, which contributes to knowledge accumulation and the improvement of tactical skills.

Thus, the main advantages of using Wargame UA include training junior commanders in planning, executing, and analysing combat operations. Thanks to its innovative features, the software significantly enhances the level of professional military training and helps improve tactical thinking skills. These components make Wargame UA an indispensable tool for the effective functioning of modern security and defence forces.

As part of the "General Tactics" training module, Wargame UA enables the visualization of realistic scenarios, including:

1) the formation of combat order;

2) planning unit movement routes considering water obstacles, minefields, or heavy enemy fire;

3) simulating coordination between mechanised, tank, and artillery (mortar) units in achieving mission objectives.

Thanks to its interactivity, trainees can assess the consequences of their decisions in real time, promoting the development of critical thinking and the ability to adapt the battle plan in response to changes in the operational situation.

As part of the "Weapons Training" module, Wargame UA makes it possible to simulate realistic fire engagement scenarios within the context of overall tactical situation. Users can define sectors of fire and consider projectile trajectories. This approach promotes a deeper understanding of how various factors (e.g., terrain relief) influence accuracy and the effectiveness of fire.

The program's level of detail allows for analysis of the use of different types of weapons in close and long-range combat. For example, servicemembers can simulate situations requiring the use of sniper rifles or automatic weapons to suppress the enemy.

Particular attention should be given to the integration of the "Weapons Training" discipline with other aspects of combat training, such as the use of UAVs and electronic warfare (EW). The software can simulate scenarios where troops must neutralise targets detected by UAVs or operate in conditions where communication is disrupted due to EW interference.

Integration with real maps in the "Military Topography" discipline ensures:

a) training in identifying key military objectives, planning routes, and developing actions based on topographical data;

b) working with digital maps to create tactical symbols, analyse terrain, and calculate distances between objectives;

c) simulating scenarios under limited visibility conditions (e.g., at night or in fog), which helps develop skills for operating in challenging environments.

These features of the program enhance trainees' proficiency in navigation and operational planning on the ground.

During "Engineering Training", the software enables simulation of the placement of trenches, dugouts, shelters for vehicles, and other engineering structures according to terrain features. It also allows for the simulation of minefield deployment and clearance processes.

The program provides new opportunities for "Tactical Medicine" discipline by simulating first aid provision in combat conditions:

– creating scenarios involving personnel suffering from various types of injuries, wounds, and burns, indicating their severity;

– conducting casualty evacuation missions from combat zones, which helps develop coordination among units;

– simulating shortages of medical supplies or limited time to foster decision-making under pressure and prioritization skills.

The interactive Wargame UA software significantly transforms the approach to officer professional training by integrating modern technological tools into traditional disciplines. By simulating realistic combat situations, trainees can master complex topics in tactics, weapons training, topography, and engineering training in environments that closely replicate actual conditions. The program fosters critical thinking and improves the ability to adapt decisions in response to changes in the operational situation.

One of its key features is simulation of multi-level command and control, which enables modelling of coordination between different tactical levels – from platoons to battalions. This helps commanders understand the principles of managing large units, practice mission distribution, analyse the impact of their decisions on the overall situation, and adapt to changes in the combat environment.

Thus, the program offers unique opportunities for implementing an interdisciplinary approach to officer training, bringing together various training elements within a single interactive tool. This approach allows trainees to acquire simultaneously knowledge from multiple disciplines, combining theory and practice in an integrated format. For example, while completing practical tasks, students can apply their knowledge of tactics, topography, and engineering training, while also considering logistical and medical factors. The interdisciplinary approach contributes to a comprehensive understanding of planning and management principles, which is an essential component of effective command at all levels.

The effectiveness of using the interactive program largely depends on the competence of teachers and instructors. A lack of subject knowledge, insufficient ability to adapt skills to the program, or reluctance to adopt new technologies may limit its potential. Additionally, the complexity of using the software may pose challenges for trainees with limited experience in digital tools.

Despite the program's broad capabilities and the instructor's expertise, there are certain limitations in recreating complex combat scenarios. For instance, simulations may insufficiently account for elements such as psychological pressure from the enemy, informal leadership, or unpredictable factors present in real combat situations.

Conclusions

Given the stated limitations and taking into account the interests of all participants in the professional training process, it is appropriate to outline the key directions for the future development of the software product.

1. Development of a mobile application opens up possibilities for convenient use in field conditions. This would allow trainees to practice during exercises at training grounds. Mobile versions would improve accessibility across various levels of military training.
2. Reduction of manual input in the modelling combat operations (situations) process through increased automation.
3. Expansion of functionality for a more complete (detailed) representation of the tactical situation.
4. Integration of the program with other platforms for simulation, situational awareness, or resource management to enhance significantly its functionality.
5. Expansion and development of new scenarios that reflect modern threats and conditions, such as information operations or combat in urbanized environments, would improve the program's adaptability to the realities of modern warfare.

In conclusion, the Wargame UA interactive combat management simulation program is a promising tool that can significantly enhance the quality of professional military training if implemented effectively.

Further development of the program through integration with other platforms, the development of mobile applications, and the creation of modern combat scenarios will enable a significant expansion of its functionality.

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А. Ф. Головня, В. А. Білінець, С. В. Бєлов

ОБҐРУНТУВАННЯ ТЕОРЕТИЧНИХ ПОЛОЖЕНЬ ВИКОРИСТАННЯ ПРОГРАМИ WARGAME UA У ПРОЦЕСІ ПРОФЕСІЙНОЇ ПІДГОТОВКИ

Обґрунтовано ефективність інтерактивного програмного продукту Wargame UA у професійній підготовці військовослужбовців, визначено його потенціал для моделювання сучасних бойових сценаріїв, а також проаналізовано можливості інтеграції з навчальними модулями. Дослідження спрямоване на оцінювання впливу програми на освітній процес, виявлення її переваг і обмежень.

Вивчено функціональні можливості програми Wargame UA для моделювання бойових ситуацій. Здійснено оцінювання її практичного впливу на навчальні модулі, зокрема загальну тактику, вогневу підготовку, військову топографію, інженерну підготовку й тактичну медицину. Особливу увагу приділено аналізу командної взаємодії та комунікації між підрозділами в інтерактивній моделі.

У дослідженні застосовано: комплексний підхід, аналітичний метод – для оцінювання функціональних можливостей програми та порівняння її з аналогічними програмними продуктами; емпіричний метод – для виявлення практичного впливу програми на розвиток тактичного мислення і комунікативних навичок тих, хто навчається; метод спостереження – для аналізу взаємодії учасників та ефективності виконання завдань.

Результати дослідження підтвердили, що програма Wargame UA є ефективним інструментом для відпрацювання бойових сценаріїв і сприяє формуванню у командного складу ключових компетентностей. Завдяки здатності моделювати реалістичні сценарії ті, хто навчаються, отримують практичний досвід, який складно набути в межах традиційних форм навчання. Програма забезпечує інтеграцію різних навчальних дисциплін, даючи змогу водночас застосовувати знання з

тактики, топографії та інженерної підготовки. Вона також суттєво впливає на розвиток критичного мислення і здатності ухвалювати оперативні рішення в умовах, що змінюються.

У процесі дослідження виявлено й певні обмеження, які можуть знижувати ефективність програми, зокрема йдеться про недостатню реалістичність симуляцій у частині психологічного впливу та непередбачуваних бойових чинників. Існує також потреба у висококваліфікованих інструкторах. У статті наведено рекомендації щодо вдосконалювання функціоналу програми шляхом розроблення мобільних версій, інтеграції з іншими платформами та створення нових сценаріїв, які враховують сучасні загрози.

Отже, дослідження акцентує на значущості інтерактивних програм для професійної військової підготовки й обґрунтовує перспективи їх подальшого розвитку задля підвищення ефективності освітнього процесу та адаптації до сучасних викликів бою.

Ключові слова: *інтерактивна програма, сили безпеки і оборони, моделювання бою, професійна підготовка військовослужбовців, взаємодія підрозділів, планування бою, аналіз бойових дій.*

HOLOVNIA Andrii – Doctor of Philosophy, Deputy Head of the Department of Command and Staff Training of the Center of Retraining and Professional Development, National Academy of the National Guard of Ukraine
https://orcid.org/0000-0001-9188-0055

BILINETS Volodymyr – Lecturer of the Department of Command and Staff Training of the Center of Retraining and Professional Development, National Academy of the National Guard of Ukraine
https://orcid.org/0009-0009-6990-4570

BIELOV Stanislav – Private Entrepreneur
https://orcid.org/0009-0008-6395-7180