

## WARGAMING THEORY

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**Abstract:** *In this article, we want to make an overview of a distinct stage in the process of planning military operations, namely wargaming. From our point of view, as specialists in the field of military art, wargaming is a particular aspect of the decision-making process, offering the possibility to identify optimal response solutions, depending on certain variables of the operational environment. Thus, in this approach, we will start from the main historical landmarks regarding the appearance and development of the domain, so that later we can present certain particularities of wargaming, on which occasion we will be able to identify the general theory of the domain, next to developing a series of directions of action, adapted to probable courses of action of a possible enemy. The development of military art, the experience of military strategists, the emergence of new technologies, and the adaptation of tactics to changes on the battlefield, represent a milestone in the way of conducting both warfare and wargaming. The only constant in this field is that human imagination is limitless and we can only hope that the military specialists will find the proper solution to transform fiction into a reality. Thus, we address not only the specialists but also those who are at the beginning of their military career, offering a perspective on the field.*

**Keywords:** *wargaming; course of actions; decision-making process.*

## Introduction

The main topic that we intend to analyze in this paper with a scientific point of view is the wargaming theory, the main purpose is to identify its possible evolution and the ways that this theory could influence the conduct of operations during military campaign.

To achieve this purpose, we resorted to a historical analysis of the evolution of war games, with increased attention on the advantages that a commander could benefit from a battle simulation. Next, starting from the concepts specified in military doctrines, manuals and instructions, using the hypothetical-deductive analysis, we will highlight what could be the wargaming's major impacts over the own courses of actions.

At the end of the paper, we will submit to attention the conclusions by following the analysis we proposed at the beginning.

The motivation for choosing this topic for analysis is given by the proximity of the Russian – Ukrainian conflict and the need of identifying a way to predict any impact that it could have over national interests.

The novelty of the research lies in the analysis of the evolution of war games and the one of the specific procedures that establish the general framework in which these simulations take place with an increased focus on the methods most used during exercises and training programs in Romanian National Defence University.

Human urge of establishing peace and global harmony, obliged our leaders to identify a variety of ways to defuse tensions, put an end to armed conflicts or wars or, at least, to reduce human and technical losses and financial costs. From this point of view, the importance of simulating a battle is without question. Having the alternative to identify

strengths and weaknesses, vulnerabilities, critical capabilities and everything else needed for the success of an operation without involving troops movements or losses of human lives and equipment is of major importance and offers the possibility to assess a lot of courses of action in a shorter period of time.

## 1. Wargaming overview

For a very long time both historians and philosophers struggled to answer a numerous of intricate questions. Among all of these, we can identify one that is very much related to armed conflicts, namely wargaming. From our point of view, it is not relevant if human kind had faced either warfare or developed a simulation of the battles in the first place. We consider that the most important fact is that, in accordance with human nature, no effort had been spared in order to improve the efficiency of the fights, on the one hand and to save lives on the other hand. It seems that these two antagonist feelings, living together in our minds, are of the utmost importance in the progress of our society. Therefore, the development of one of these branches induced a symmetrical effect on the other. As much as the tactics or technologies involved on the battlefield were developed or invented, technics and methods of the wargaming were adapted and improved to the same extent. Thus, we can observe that the history of war simulation is in a strong connection with the history of the way the battles are fought. As a result, in order to accomplish a study regarding the history of wargaming, we have to concentrate our efforts on the history of the armed battles, development of technology and evolution of tactics and strategies as all that impacted the simulation process.

It is very difficult to determine which of the warfare or wargaming appear the first in human history. Taking into consideration that every conflict and every game is based upon a strategy in order to claim victory, it is easily to observe the strong connection between the two concepts. Being so, according to some researchers, the complexity of the game of Chess and Go is a strong argument that these two games could be the source of inspiration for the modern battle simulation (Goria 2011, 1 - 16). Moreover, the real masters of the game have that unique ability to conceal their true intentions in front of the opponent, the very essence of military art: “*all warfare is based on deception*” (Tzu 2000, 3). Even for this single reason we are inclined to declare that there must be a very close connection between the two ancient games and the way the battles were fought in that era. What’s more, when it comes to chess, the similarity between the game figures (kings, queens, bishops, knights, castles and foot soldiers) and the specifics of the fighting units are conspicuous. This similarity and the facts that for a very long time the *Queen* was known as the *General* or the *Prime Minister* (Dunnigan 2005, 140), and that the end of the game coincide with the surrender of the *King*, the symbol and the highest representant of a nation and an army, are also evidences that the Game of Chess is one primitive attempt to transpose field events on a flat, small surface always at the disposal of the supreme commander.

As stated above, the development of the warfare and the evolution of its simulation go hand in hand. Consequently, as the inventions and innovations in the field of army fighting transformed and enlarged the dimensions of the conflicts, in the same manner, the games used to imagine the courses of action readjusted in order to face the new challenges. In our opinion, out of the multitude of factors that had a significant impact on the progress of the battle simulation, was, the discovery and the use of the geographical maps. From this point forward, the planners and the engineers were able to simulate the movements of the troops more closely to reality, having the opportunity to establish the distance covered by a specific unit in accordance with the variety of the field, the presence or absence of rivers or other difficult terrains. Furthermore, the technology also influenced the way of conducting wars. Every new breakthrough had an application in the military field, either improving the capabilities of the

standard fighting units of by creating the necessity of new specific units. In every moment of our history, all these changes induced by technology were requested to be part of the new simulations. Thus, the chess board consisting in 64 planned squares became obsolete, being replaced with maps whose accuracy was strictly dependent on the technological possibilities of research and simulation of the battlefield. Moreover, the 16 figures of each chess gave way to a variable number of objects representing divisions, battalions or companies, coded according to the main characteristic of their use in battle. Around 1650, in Prussia, the so called *Koenigspel* (King's Game), nothing else but the so called first "War Chess" emerged and included a different number of figures displayed on a bigger board reflecting the reality of the wars conducted in the XVII century. What is considered to be the first simulation of naval conflict is identified to have been organized for the first time in the second half of the XVIII century, when, using warships represented by small wooden pieces, the players managed to imitate a real fighting action at sea, even the wind effect over the ships' maneuvers or the effect of the firing shots upon the enemy battleships (Goria 2011, 1-16).

The importance of the wargames became indisputable. Every new hypothesis, theory, strategy or tactic could have been tested without involving a large number of troops and equipment, implying a dramatic reduction of costs and the opportunity to invest in better preparation of the military personnel or in the modernization of the military units and fighting equipment. Also, it seems to me, that it was in this period of time that the specialization of the wargaming players became an absolute necessity. Therefore, besides the supreme commander and the other commanders, functions such as operators, maintainers or engineers made their presence felt and became indispensable for the accuracy of the simulation. Moreover, simulations were used to validate those innovations and to apply them in future battles (Goria 2011, 1-16). Before making a change of the strategy or tactic, commanders had the chance to test it before the battle and, depending on the conclusion of the game, decide whether to apply it or not in military actions, saving a lot of money and, more important, saving the lives of their comrades.

The apparition of aviation and submarines represent a milestone in the way of conducting both warfare and wargaming. It forced engineers to exceed the limits of the imagination, in order to create a virtual reality as accurate as possible. From this point forward, the classic simulation of the battles became obsolete, on the one hand due to the high speed of aerial operation, a real challenge for the operators, and, on the other hand, due to the request of a tridimensional representation of the battlefield, in order to introduce submarines in the actions. It was the development of the Information Technology – IT – that solved that huge problem. The tremendous impact of IT over the game simulation is hard to imagine. Suddenly, almost anything could be visualized on the display of a computer. Nothing seemed to be impossible, the only limit residing in the restrictions of human imagination. From now on, with a very reduced cost, thousands of simulations, happening in different places of the world, having different combatants and equipment became available on the same device, located far from the battlefield and returning much more data. All of that in a significantly shorter period of time, involving a reduced number of additional staff, improving therefore the level of security and decreasing the risk of information leaks.

Involving more and more non-military experts in the simulation of armed conflict, it was only a matter of time until a company would have the idea to use this concept for civilian purpose. This happened in 1958 (Dunnigan 2005, 141), when a dedicated company decided to create an edition for civilians, a real turning point in the history of game simulation. Having the possibility to test different theories in a short period of time, with fewer employees and, more important, with a huge reduction of costs and risks, made the civilian leaders to concentrate their resources in the development of these applications. The unprecedented rapid pace of change in the civilian environment could only be matched by that of computer development. From

this point forward, the human history is a mixture between the military and civilian technology in almost every field of activity, especially the imitation software. The games of war, by the high imitation of the military assets, represent the undisputed evidence to highlight this fusion. In these video games, ships, aircrafts or tanks are designed with an unseen accuracy and their actions are subject to the rigors and limitations of the battlefield reality. Perhaps, the most important advantage of these games is the fact that they are addressed to all people, indifferent their age or occupation, allowing engineers and planners to have a better and unrestricted feedback about their work.

Therefore, we have taken a trip throughout the history of wargaming to see how the evolution of the military actions, tactics and strategy impacted the simulation of the battles. The purpose of a tactical wargames is to identify some important lessons by recreating a specific battle with army maneuvers or to propose the best solution in order to minimize the loses and to attain victory in the future armed conflicts. We highlighted that most of tactical maneuvers and strategies could be tested and validated with this system, in order to streamline the entire defense process of a nation, by reducing the costs and the loss of military personnel and equipment.

Furthermore, in our opinion, this information visualization tool allows us to perform competitive intelligence practices with the possibility to add value to information by its representation. Another advantage is to extend the question about the operational environment to identification of threats and opportunities linked to a specific military action. In the continuation of this idea, decision-makers can identify where the major impact of an action could be.

Finally, not being able to foresee the new technological breakthrough, it is almost impossible to predict the design of the future warfare simulation. We can only imagine that the development of the new quantum computers will have in this domain. The only constant in this process is that human imagination is limitless and we can only hope that our intellect will find the proper solution to transform what seems to be a fiction in a future reality. Not less important is that internet provides us the essential infrastructure to interconnect our devices giving us the opportunity to transfer information from one corner of the world to another with the speed of light, this advantage being available for a variety of purposes such as military cooperation, simulation of the integration of combat units from different countries or in the educational process.

## **2. Wargaming process particularities**

During history, great generals understood that anticipation is very difficult to achieve, therefore, their most important ability was to find new and better ways to analyze the adversary and to identify as many enemy Courses of Action as possible. For this reason and not only, the battle simulation became one of the most important steps during the planning process, giving the possibility to assess the potential of the own Course of Action (COA) to fulfill the mission against the opponent COAs and to correctly identify the deficiencies. However, the real value of the war game is that it allows the commander and staff to synchronize and visualize the conduct of operations. It can help anticipate possible events, identify potential risks and opportunities that may be necessary to counteract and exploit different situations, with the final purpose of achieving victory (SMG-3 2016, 125). In order to get the most out of a war game, Joint Operations Planning Group (JOPG) should maximize the efficiency of the simulation by taking into consideration a variety of factors such as: available time for planning and for execution, critical events to be played, the need for the involvement of subordinates, commanders in support and cooperation with relevant national and international actors, the type of war game - staff estimation, map exercise, operational

analysis (SMG-3 2016, 125), etc. From our point of view, the success of a war game is strictly related to the appointment of a coordinator, whose main purpose is to carry out the preparation of the simulation and to maintain an objective approach of every actor involved in the process.

Studying the planning process and the different approaches of the wargaming, we can observe that usually, the simulation process includes several phases such as: setting the conditions, conducting game rounds and evaluation. Though each of these phases has a specific format, JOPG should always remember that flexibility is one of the most important qualities of a good officer, therefore, they should not be limited to this. Generally, the setting the conditions phase is an introduction setting out the strategic and operational conditions that influence the operation, including political considerations, the nature of threats, environmental, civil, media, information conditions, etc. Additionally, the conducting game rounds refers to a series of rounds of play on the typology of action - reaction - counter-action, every time giving the initiative to the opponents. Finally, the evaluation involves the assessment of the probable results and conclusions that would follow after each round, being used to determine the conditions under which the next rounds will take place.

The game starts with the "Action" item. The head of the cell initiating this move (Part A) will present his own COA segment which will be analyzed, highlighting the threats identified during it. This presentation will also include the objectives to be achieved, the measures taken by the forces themselves, the level of detail established, all available forces and capabilities, the tasks assigned, the description of the planned combat actions, as well as the deployment and maneuver of the forces. Next, the "Reaction" element in this move, is very important to determine which actions taken by Part A in the "Action" can be discovered / identified. "Counter-reaction" is the element that ends the move. This is the most flexible element of the cycle. The representative of Part A will present his options regarding the actions / threats presented in the "Reaction" (SHAPE 2013, 4.73-4.81).

Based on the above aspects, it may be necessary to revise your own COA. No major COA changes are made during the execution of the war game, the process is stopped, the changes are made and the game is resumed. The purpose of the analysis phase of each cycle is to record the information identified by the game director and the resulting conclusions in the synchronization matrix. The results recorded during the "Action", "Reaction" and "Counter-reaction" will be evaluated by the participants. Depending on the method of play of the war game chosen, the next cycle may be, chronologically, closely related to the previous one or represent the beginning of a new segment, staggered in space and time.

There are many conclusions that the JOPG could extract after a well-played war game. According to military literature and documentation, among the most important results of the war game are: validation of own courses of action, identification of decisive points, the need of elaborating variant plans or/and alternatives, new information requirements that should be sent to designated structures, synchronization of actions, identifying the advantages and disadvantages of each COA, risk assessment and identification of ways to reduce it, updating initial estimations, updating the costs, proposals to amend the Rules of Engagement (ROE) or identification of opportunities and vulnerabilities, additional strength and capability requirements, loss estimation, etc. (NWP-5-01 2018, 4-21). Out of all these, we can conclude that the war game can improve some planning aspects like the succession, in space and time, of the stages of the planned operation, the required level of coordination between forces, the synchronization of the forces participating in the operation, the determination of the necessary own capabilities and the fighting power of the forces, etc.

The conclusions of the war games support the staff in establishing the organization of the forces for the execution of the operation, the synchronization in time and space of the actions of the forces, as well as in the realization of the decision support matrix. For this, all the data provided after the rounds of the war game must be recorded in such a way as to facilitate the

activity of comparing the courses and drawing up the operational plan. There are two known ways to do this: the synchronization matrix and the course analysis worksheet. Both methods support the staff in recording all observations regarding the identified strengths and weaknesses, additional tasks for subordinate units, or the organization of the necessary command-control system.

The experience developed at Romanian National Defense University gave us the opportunity to participate in a variety of exercises, whose main purpose is didactic, as a consequence we are able to list some of the conclusions obtained from the war games during these exercises: the analysis team improved the force organization for the mission and managed to develop a synchronization matrix. Also, it was easier for them to identify advantages and disadvantages of each COA, to identify variants and alternatives or to identify some risks that may affect the development of real actions. Moreover, the planners were able to visualize and to improve the succession and synchronization of military actions between the river and the sea, to evaluate and to change the surveillance and striking alignments, to reconsider the accepted risks, etc.

From the multitude of methods in which a war game can be played, based on our experience, we can identify some fitted for didactical purposes of the wargaming: the war game in phases of the operation; the war game for going through the decisive points; the war game on segments of the operational environment (SMG-3 2016, 125-129).

The development of the war game in phases of the operation consists in the analysis through war game of the main tasks of the assembled forces, related to some phases of the operation, well defined in time, in relation to the objectives associated with the phase. In terms of the fidelity of the results, this model is based on predefined scenarios in which participants intervene in the decision. Thus, a major disadvantage in manual warfare is that the outcome and sequence of events are influenced by the decisions made by the players. The advantage is that the phases can be carefully chosen so that the war game allows a realistic picture of possible situations in the short term. Also, an error in one phase of the game does not affect the analysis of the next phase. In this case, the challenge for planners is to identify computer-assisted warfare solutions where the decision maker can make a decision with minimal errors (SMG-3 2016, 125-129).

The development of the war game for going through the decisive points consists in the realization of a war game in which the elements of analysis are based on the need to fulfill some decisive conditions, defined by the main tasks of the assembled forces. Decisive points lead to the enemy's center of gravity. The turning points represent those critical moments of the military action that allow the transition to the next stage, so that the succession of the decisive points leads to reaching the proposed final state. The advantage of this method is that there are concrete possibilities to quantify the results, both in the manual war game and in the assisted one. The disadvantage is that a wrong analysis of a decisive point, in a cascade, leads to errors propagated to the following decisive points analyzed (SMG-3 2016, 125-129).

The method of conducting the war game on segments of the operational environment consists in identifying the results obtained by analyzing the main tasks specific to the different areas of action. The advantage is that tasks specific to one medium of action do not influence the outcome of the analysis of another medium of action. The disadvantage is that an analysis of a common task, related to two means of action, can produce different effects without identifying where the error is (SMG-3 2016, 125-129).

Following personal practice, we are able to recommend a number of methods for conducting war games at the tactical level, that can be used individually or in combination:

- avenue in depth method;
- belt (strip) method;
- box method;

- area method;
- the succession of essential tasks method.

The avenue in depth method is suitable for both offensive and defensive courses of action if in the area of operations there are clearly delimited directions in the field. Based on the analysis of decision points, critical events and centers of gravity for all forces analyzed, this method is the correspondent of the war game method for traversing the decisive points at the operational level.

Using the strip method, the area of operations will be divided into transverse strips (across the width of the area of operations), and the components of the battle will be analyzed in stages. It is a good method of analysis as it provides information about all the forces that influence a certain event, which is why it is recommended especially for actions that take place over large spaces (delay operations, contact advance), analysis of different stages of an operation (forcing a river) or when the enemy is grouped in clearly defined and identified echelons. This method helps us to analyze sequentially the actions carried out along the entire front of the designated strip, but it is recommended to include portions of strips belonging to neighbors, in order to assess the influence of their actions on the actions of their own forces.

The box method involves the analysis of critical events in certain districts, sectors, employment area, the delimited area being isolated and the simulation channeled strictly on the area. This method involves concentrating the development of the war game in a certain geographical area, in which a certain effect must be achieved. Applying this method, takes into account that the delimitation of the chosen area is done taking into account the general characteristics of the terrain, the alignments of their own forces, the areas of action of the acting enemy, specific geographical boundaries (delimited by lakes, rivers, deltas, beaches, mountains, roads communications, etc.). The method is used when military actions are planned in areas of operations delimited by predominant geographical features.

The area method involves subdividing action rates into subareas in the area of operations. Each subzone corresponds to a time segment to be analyzed. When this method is used, the planning group isolates the area and focuses on critical events within that area.

The method of succession of essential tasks is one of the handiest. This method involves traversing one or more-time segments of the COA. Dividing a COA into time segments can be done in two ways. A process involves dividing the COA into segments with equal time intervals, identical for all own and enemy COAs (OPFOR). Another procedure is to divide the COA into segments with flexible time intervals that correspond to the tactical sequences. The method of the succession of essential tasks allows to determine the way in which the execution of an essential task achieves the success and identifies the conditions for the development of the next phase of the operation. It also offers the possibility to review the course of action according to certain possible reactions of the opponent.

In view of the above, we consider that military planners have at their disposal adequate tools for analyzing the indices and warnings that underline the development of COAs, based on the results of a war game that respects the most fundamental principles of planning, analysis, and an optimized decision. The methods of war games presented, along with the particularities of the field, offer the possibility of developing an overview of the possibilities of analyzing possible situations, for an informed decision.

## **Conclusions**

According to doctrinal precepts, the most widely used principles of the war game in the virtual environment are related to the type of operation, the purpose, and mission of the structure, and the initial conditions listed in the scenario. The scenario provides a captivating environment in which all games take place.

Similar to the operation planning process, in the wargaming process, the formulation of purpose and objectives is essential to ensure that an issue to be examined has been correctly formulated/framed.

As a particularity, the players and their decisions are the basis of all war games so the objectivity of war games is represented by the fairness of the players' decisions.

Simulation is the essence of the action models contained in the war game. All simulations are based on data and data sources that underlie the action models. According to the aspects presented in this approach, it can be seen that the simulation can be computer-assisted or manual. Thus, the decision of the planning group is better to be based on the assisted analysis process.

With the mention that we can consider our intervention to present certain aspects of the process, we are sure that we come to the aid of those who want to develop the subject in order to develop this overview. Finally, through this intervention, we emphasize the importance of the war game in a process of planning military operations.

From a didactic point of view, as specialists in the field, we emphasize that in addition to the results of the war games we simulate, our experience grows with the results collected in the game – which are normally needed to help us understand what happened during a war game and strengthen its benefits. We transmit this experience from generation to generation of students but also to military teachers.

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