

MILITARY ART AT THE END OF THE TWENTIETH CENTURY AND THE BEGINNING OF THE 21ST CENTURY

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Abstract: *The military strategy of the future is characterized by the digitization of the battlefield (space) and the integration of operations. Large US units are digitized and operate with weapons systems and equipment trained at the Combat Training Center (CTC), Joint Readiness Training Center (JRTC) and National Training Center (NTC).*

Politically, the war of 20 March 2003 is one of strategic partnerships. The US has adopted three strategies (political, economic and cultural) and a Network-Based War (NBW) in which it uses C4I2SR systems and the following resources: human, economic, financial, high-tech, information technology, infrastructure and communications structures.

Keywords: *Strategy, digitization, operations, resources, military art, international organisations*

1. INTRODUCTION

World War II broke out in Europe by Hitler's Germany in 1939 when Poland was attacked. In 1940, Denmark, Norway, Belgium, the Netherlands and France were also conquered. Romania was conquered without a fight, but by the Soviet ultimatum and the Vienna Dictate of 1940. The following year Germany attacked Yugoslavia, Greece, the U.S.S.R. and Libya.

In Asia, Japan attacked China, Indochina and Southeast Asia, and in 1941 the attack on Pearl Harbor took place.

The Allies began to gain victories in Moscow in 1942 and in North Africa, the victory at El Alamein. In February 1943 the Soviets defeated the group of German armies at Stalingrad. The Americans win the Midway (Pacific Ocean) and the Coral Islands.

In Europe, in June 1944, the landing in Italy and Normandy took place. In 1945, the Americans dropped the two atomic bombs: Hiroshima

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and Nagasaki. The most important consequence of World War II was the bipolarization of the world and the outbreak of the Cold War. The number of losses (deaths) of this world conflagration was 55 million, of which 45 million in Europe (20 million in the U.S.S.R.). Continental Europe and the U.S.S.R. were destroyed. Since then, the sword of Damocles - the nuclear sword has threatened the whole world. This danger has not disappeared even today. German cities were destroyed by British and American strategic bombing (industrial bombing and terrorist bombing)¹. The Cold War lasted from 1947 to 1991 when the U.S.S.R. fell apart. In 1945 the Soviets invaded Korea and in 1948 created North Korea. Then the U.S.S.R. experience the first atomic bomb. In 1947, "Truman Doctrine" appeared in support of the states fighting against communism. This doctrine laid the foundations of the policy and strategy of curbing communism, the northern heartland (of the U.S.S.R.). In addition, Truman developed a strategic plan for the rapid development of Western Europe and its removal from communist influence, a plan known as the "Marshall Plan" ("Stalin's Death"). In 1959, a number of 16 Western states benefited from Marshall financial aid (\$ 72 billion). In response, the socialist countries set up the C.A.E.R.² Stalin's rejection of the American offer (Marshall) was an act of war by creating a barrier that could not be crossed. Western states created in 1948 the R.F.G. (Federal Republic of Germany), which produced the Soviet blockade of Berlin until May 12, 1949, when Stalin lifted the blockade. In 1949, NATO (the North Atlantic Organization) was established on April 4, initially bringing together 12 states: Belgium, Canada, Denmark, France, Iceland, Italy, Luxembourg, Great Britain, Norway, the Netherlands, Portugal and the USA. In response to this act, on May 14, 1955, a number of eight states - Albania, Bulgaria, Czechoslovakia, the GDR, Poland, Romania, Hungary and the USSR - signed a military collective security treaty in Warsaw.

¹ Lidell Hart, *Strategia acțiunilor indirecte*, Editura Militară, București, 1973, pp. 361-362.

² C.A.E.R. - Mutual Economic Assistance Council

2. INTERNATIONAL SECURITY ORGANIZATIONS

The main international security organizations are: the United Nations (UN); North Atlantic Treaty Organization (NATO); European Union (EU); Organization for Security and Co-operation in Europe (OSCE).

The most comprehensive and important security organization is the United Nations, which was formed after the end of World War II in October 1945 in San Francisco. A number of 51 states participated in the founding of the UN, of which we mention: USA, France, United Kingdom, U.R.S.S. and so on. Since then and until today, the organization has increased its number and reached 193 members.

Although Romania wanted to join the UN since 1946, the accession of our country took place in 1955. The UN General Assembly decided, on December 14, 1955, by resolution A / RES / 995 (X), to receive Romania and other 15 countries in the UN.

By signing the Charter of the United Nations by the founding members, they have joined forces to maintain world peace as follows:

- *“Maintain international peace and security and, to this end: take effective collective measures to prevent and eliminate threats to peace and to repress any acts of aggression or other violations of peace and to carry out, by peaceful means and in accordance with the principles of justice and international law, the settlement or settlement of disputes or situations of an international nature that could lead to a violation of the peace;*

- *To develop friendly relations between nations, based on respect for the principle of equal rights of peoples and their right to self-determination, and to take any other appropriate measures to strengthen world peace;*

- *To achieve international cooperation in solving international economic, social, cultural or humanitarian problems, in promoting and encouraging respect for human rights and fundamental freedoms for all, regardless of race, sex, language or religion;*

- *To be a center in which to harmonize the efforts of nations to achieve these common goals.”*³

The UN is structured around six main bodies: the General Assembly, the Security Council, the Economic and Social Council, the Board of

³ The United Nations Charter, San Francisco, 24 October 1945.

Trustees, the International Court of Justice and a Secretariat, as well as specialized agencies, programs and development funds.

The North Atlantic Treaty Organization (NATO/OTAN) is a politico-military alliance that was established in April 1949 in Washington by the signing of the treaty by the U.S.A. and Canada with 10 European countries; The organization currently comprises 30 Member States in Europe and North America.

Romania was officially received into NATO structures on March 29, 2004, after the completion and transmission of the ratification protocol within the U.S. State Department, along with Bulgaria.

NATO has working structures composed of NATO delegates, military representatives from the member states and a general secretary, being organized according to the political / military specifics as follows: Nuclear Planning Group, North Atlantic Council and Military Committee, respectively.

As stated in the first article of the Washington Treaty, *the Parties undertake, in accordance with the provisions of the Charter of the United Nations, to settle by peaceful means any international dispute in which they may be involved, so as not to jeopardize peace and international security and justice, and to refrain in international relations from resorting to the threat or use of force in any way inconsistent with the purposes of the United Nations* ⁴, the purpose of the organization is to strengthen the principles and foundations of the Charter of the United Nations, to become a guarantor of the state of security, balance and stability necessary to create an environment conducive to democratic development.

The European Union (EU) has a decisive role to play in ensuring a secure environment. In 1993, the Treaty of Maastricht, the Netherlands, entered into force, transforming the European Community into the European Union, a political and economic organization of which 27 states are members. Romania has been an EU Member State since January 1, 2007.

"The objectives pursued by the Member States of the Union are:

- promoting economic and social progress, by creating an area without internal borders, by strengthening economic and social cohesion

⁴ *North Atlantic Treaty*, Washington, 04 april 1949.

and by establishing an economic union, including the creation of a single currency;

- asserting one's identity on the international stage, in particular by implementing a common foreign and security policy, including the establishment of a common defense policy;
- strengthening the protection of the rights and interests of the citizens of the member countries, by introducing EU citizenship;
- the existence of close cooperation between the judiciary and home affairs;
- maintaining the *acquis communautaire* (all common rights and obligations)."⁵

The Organization for Security and Cooperation in Europe (OSCE) is a major regional security organization. In 1975, in Helsinki - Finland, the Final Act was signed by 35 countries, including the U.R.S.S. and the U.S.A. "It aimed at conflict prevention, crisis management and post-conflict reconstruction and compliance with the following principles:⁶

- sovereign equality, respect for the internal rights of sovereignty;
- non-recourse to force or threat of force;
- inviolability of borders;
- territorial integrity of states;
- peaceful settlement of disputes;
- non-interference in internal affairs;
- respect for human rights and fundamental freedoms, including freedom of thought, conscience, religion or belief;
- equal rights of peoples and the right of peoples to self-determination;
- cooperation between states;
- fulfilling in good faith the obligations assumed according to international law.

The OSCE is composed of several institutions such as: the Presidency-in-Office, the Secretariat, the Center for Conflict Prevention (CPC), the Office for Democratic Institutions and Human Rights (ODHIR),

⁵ Pagnejer Bogdan Constantin, *Rolul organizațiilor furnizoare de securitate în spațiul est-european*, „Revista de Științe Militare”, no.1/2021, p. 87.

⁶ *Ibidem*, p. 88.

the High Commissioner for National Minorities (HCMN), the Representative for Freedom of the Media , OSCE Parliamentary Assembly."⁷

3. NUCLEAR DISCOURAGEMENT STRATEGY

After experimenting with the hydrogen weapon, the strategy of nuclear deterrence appears. In 1972, the United States and the USSR signed the Strategic Arms Limitations Talks (SALT). This agreement was concluded for 5 years in order to freeze the number of strategic nuclear vectors (missiles, submarines and bombers). The next SALT agreement limited ballistic missile equipment for an indefinite period. As a result, each side could have only two anti-missile systems (one around the capital and another around an intercontinental missile base). Following the emergence of new strategic weapons such as the neutron weapon, the chemical weapon and ground-to-ground vectors, the SALT 2 negotiations began.

In 1973, negotiations began between NATO and the Warsaw Pact for the reciprocal reduction of European forces and armaments.

In 1975, the Conference on Security and Cooperation in Europe concluded with the Helsinki Accords concluded on 1 August 1975 for relaxation and cooperation. The agreements accepted the 1945 borders and the buffer zone desired by the USSR. Instead, the Soviets pledged to respect human rights and freedom of expression against the government. The agreements favored trade between East and West, etc.

Beyond the Cold War, there were a number of regional wars, such as the one in Vietnam. North Vietnam was supported by the USSR, and South Vietnam by the United States. The people of the south rose up against the dictatorship and organized into a resistance movement supported by North Vietnam. On April 30, 1976, Saigon was conquered - the capital of South Vietnam and then the country was unified under the name of the Socialist Republic of Vietnam. The guerrilla war in Vietnam had two completely opposite strategies. The American strategy aimed at destroying the vital centers, which in fact did not even exist, and the guerrilla forces. The guerrilla strategy sought to exhaust American forces and entrap them into

⁷ *Ibidem*, pp. 88-89.

traps, jungles and destroy them in parts, exhausting them and forcing them with the help of world public opinion to withdraw from Vietnam. So the Vietnam War was a confrontation between the classical forces and the guerrilla forces.

4. A NEW HEARTLAND - EURASIA

The events that influenced the military art of the present and the future have some peculiarities compared to the previous ones. Some continued on September 11, 2001, and others formed a new base due primarily to the effects of terrorist attacks in the United States that marked a serious turning point in the reconfiguration of the security environment and war. Terrorist attacks have revealed some of the vulnerabilities of modern society, the risks and threats of the early third millennium, and their true size was revealed only in 2002. The US reacted immediately, but the warning was not fully deciphered because beyond from what can be seen there is also a complex world of underground constructions.

According to some researchers, the USA now represents for the civilization of the planet what the Roman Empire represented for the European civilization. This can help us to develop a response model that prevents the resurgence of conflict and reduces the proliferation of crisis-generating outbreaks. Thus, for the Aristotelian analysis of the security environment and the evolution of the factors influencing the military art in the Asian space (the heartland of the geopolitical classics) these spaces can be divided as follows:⁸

- main actors (Russia, China, India, Japan and the USA);
- Central Asia (ex-Soviet space and Afghanistan);
- "Axis of Evil" (North Korea, Iran, Iraq);
- Northeast Asia (China, Russia, Japan and South Korea);
- Southeast Asia (Burma, Thailand, Laos, Vietnam, Philippines, Malaysia, Indonesia, Singapore);
- The former European Soviet space (Ukraine, Belarus, Lithuania, Latvia, Estonia and the Caucasus: Georgia, Azerbaijan, Armenia).⁹

⁸ M. Popescu, V. Arsenie, G. Văduva, „Arta militară de-a lungul mileniilor”, volumul 2, Editura CTEA, București, 2004, pp. 261-262.

⁹ M. Popescu, V. Arsenie, G. Văduva, *op. cit.*, p.262.

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This division covers a part of the continent of Eurasia where two thirds of the most developed regions are found, 60% of the world's product, 75% of the world's population and energy resources.

The vulnerabilities of the Asian and ex-Soviet space are high, but there is now a tendency to put them under national or zonal control more and more effectively (Table no. 1).

Table no.1 Vulnerabilities of the Asian and ex-Soviet space¹⁰

Vulnerabilities	By who are they generated
Economical	<ul style="list-style-type: none"> - generated by the process of transition to a market economy; - generated by the economic reconfiguration of space; - generated by the battle for Asian resources; - generated by lack of funding or funding difficulties.
Political	<ul style="list-style-type: none"> - specific to periods of transition and change of philosophy; - generated by the precariousness of the emerging political society in some ex-Soviet countries; - generated by rivalries of ideologies; - generated by the diversity of the interests of the political groups; - generated by the border process; - generated by very strong external influences.
Ethnic and religious	<ul style="list-style-type: none"> - the strong influence of the ethnic-religious factor in the reconfiguration of post-socialist societies (in the ex-Soviet space); - the tendency of some ethnic groups towards autonomy (in the Tibetan space, in the Caucasian one, in the Turkestan one, etc.); - the penetration of fundamentalism.
Social	<ul style="list-style-type: none"> - generated by anomic processes;

¹⁰ M. Popescu, V. Arsenie, G. Văduva, *op. cit.*, pp.263-264.

	<ul style="list-style-type: none">- generated by the process of re-establishing social relations;- generated by the great identity movements.
Military	<ul style="list-style-type: none">- generated by the existence of 50% of the world's nuclear arsenal, the difficulty of implementing non-proliferation treaties and the relativity of control over the use of nuclear energy, chemical and biological means for military purposes;- generated by the concept of the "axis of evil" and the way in which these states and states in the area will act on possible measures to isolate or discourage North Korea, Iran and Iraq;- generated by the start of the implementation (in 2002) by the USA of the NMD (missile defense) initiative, by the possible export of this system or of some of its components, especially to Japan, which cooperates with the USA for the realization of a missile defense system. theater - NMD) and in Taiwan, the implementation of the TMD concept and the measures that can be taken by the nuclear states in Asia;- generated by terrorist actions and the possible access of terrorists to WMD - Weapons of Mass Destruction (NMA);- generated by the military conflict of these areas, especially in the Kashmir area, in the Caucasus or in Central Asia;- generated by the process of transforming the armies;- generated by the resurgence of actions against globalization.

Following the terrorist attacks of 11 September 2001, strategies for the Asian space took an unexpected turn. Rivalries between major players have diminished in the short term, and collaboration to stabilize tense areas has intensified. At the beginning of the 21st century, what unites us was

more important than what separates us. Russia, the USA, China, India, the EU and Japan have taken into account the new course of history.

5. HYBRIDIZATION OF THE MILITARY ART

War is a *modus vivendi* of mankind; it is neither linear, nor the same, but only war¹⁵, which seems paradoxical to us. It is known that interest is the basis of politics, and this is the motive and also the reason for any war. It manifests itself in the state of normality or abnormality of humanity, in the state of pre-crisis, crisis and conflict. It follows that the war is continuous, undulating with interactive phases¹⁶. Military strategy is defined by the science, experience, art and method by which any military structure expertise and implements a political decision on the organization, planning and preparation of the army for the purpose of waging war. Strategy, as part of military art, is a complex equation used to solve the vital problems of war (defense by military means, the concept of defense encompassing all political, military and other actions that a country or coalition undertakes in self-interest or in any other interest). So, behind any military action, there is undoubtedly a political, economic or other interest.

From ancient times the war has been composed of an enormous series of subtle and hidden maneuvers in order to mislead the enemy and put him in front of an accomplished fact or complicated and even hopeless situations. In any war, the military art or the strategic art of war was the art of deception.

The classical military strategy (once called the great tactic) in the period of war preparation aimed to hide the intentions of the war, the forces, means and resources, the achievement of a fulfilled fact and the strategic surprise¹⁷. In the wars of the world, the battle took place, as in the game of chess, between intelligences, but also between characters. Napoleonic military art proved this truth. But the art of deception was not invented by Napoleon. It appeared many thousands of years before it (Sun Tzu's "Art of War" and Kautilyo's "Arthashastra"). So military art and implicitly military

¹⁵ Gheorghe Văduva, *Strategia militară, azi*, „Revista de Științe Militare” no.2/2021, p.19.

¹⁶ *Ibidem*, p.20.

¹⁷ *Ibidem*, p.21.

strategy are related to war but they are not limited to that. There is no strategy where there is a possible confrontation between large groups of forces. At the same time, the strategy is not the tactics of the moment or the philosophy of the moment, but the science, experience and art of forming mentalities and preparing the forces, means and resources to create the capacities and capabilities necessary to solve extreme situations through an extremely violent confrontation. It is important to know that war is not just a battle, not a succession of battles, and strategy is not just science, experience and the art of behavior in a battle. It represents the nonlinear and subtle equation created by theorists and applied by strategists to address not only a battle, but an entire war. No one, not even Napoleon, found the miraculous key to solving all the problems of a war (a military confrontation). All the more so as the military confrontation is not only military, but also political, economic, social, informative, cognitive, etc. Today, the concept of DIME (Diplomacy, Information, Military Means, Economy) is also used. The financial system creates crises, conflicts and even wars. Thus, the war of the world against the world (on a global scale) is the great endogenous war of the hybrid type world, difficult to understand in depth, difficult to bear, to bear because of its complexity and flexibility. The pandemic caused by COVID-19 shows how subtle and perverse the endogenous war of the world we live in can be.

Today, international organizations, network nodes, non-state identities, corporations, elements of cyberspace, globalist circles are straining, upsetting and viralizing the international strategic situation¹⁸. All this and much more produce substantial changes in the development of military strategies that are no longer purely military. Today they contain civil-military, diplomatic, informational, cognitive and economic-financial elements¹⁹. Consequently, today, a war with continuous fronts and the engagement of large units the size of United Armies are no longer relevant. The hypersonic speeds of missiles that can hit in an hour - an hour and a half any point on the globe have changed the data of the problem. Some concepts of strategic action (coverage, strategic defense, strategic offensive, strategic maneuver on internal or external lines, etc.) need to be rethought

¹⁸ *Ibidem*, p.23.

¹⁹ *Idem*.

and reconfigured. Real-time information transmission, hypersonic speeds, robotics, cyberspace and space forces are once again revolutionizing military art.²⁰

6. LEVELS AND CONDITIONINGS OF THE MILITARY ART

The Supreme Council of National Defense (CSAT) and the Parliament are responsible for engaging the army in war or in any strategic, operational or tactical military action.

4-5 levels of the decision to prepare and use an army are known:

1. The level of the political decision maker;
2. The level of the strategic decision maker;
3. Operational level;
4. Tactical level;
5. The individual level.

The political-decision-making level establishes the size (extent) of the army, the aims and objectives of the establishment, maintenance (maintenance) and use of the army, as well as the provision of the necessary resources. The political decision-maker explains to the nation why it is necessary for the people to bear the costs (2% of the Gross Domestic Product) of maintaining and training the army. The explanation is a truism, but it is difficult to explain to the common man. The truism is that only what you defended or conquered with the sword is and remains of the country. This is the fundamental law of the world in which we live. But other explanations must be found to be accepted by the common man, who can barely buy a loaf of bread and pay taxes and the cost of maintenance - electricity, heat, etc.²¹

The strategic level represents the level of vision, forecast, evaluation, organization and planning. The vision is necessary for the strategic theorist, the strategic decision maker and the strategic toilers to assess the situation, to predict its evolution, to determine the level of strategic risk and to expertise the policy maker and to plan the long-term strategic action. At this

²⁰ *Ibidem*, pp. 23-24.

²¹ *Ibidem*, pp. 24-25.

level one must see the connections, interactions, determinations, identify and analyze the consonances, the main (key) elements of the strategic level and path, the areas of strategic interest, the dynamics of threats, vulnerabilities and strategic risk; to understand and know in detail the factors of strategic power, technology, information and management.²²

At the operational level, the problems of organization, planning, control and implementation of devices, operational framework, vital connections in implementing the strategic decision in assembling tactical actions in an operational (operational) vision of force projection, complex assurance and protection in the various stages of operation and preparation for leadership, coordination and security of forces, means, operational actions and devices.²³

The tactical level is that of direct execution that implements decisions not only in the actual training of troops, but also in combat action. This level belongs to the units and large fighting units, to those who carry the burden of the training process and take the extreme risk in combat. In fact, not only in combat, but in any action, from the training to the peacetime theaters of war operations. Here is the sole of the army and that of military action at the tactical level. It is true that today, the tactical level, in some circumstances, can acquire strategic value, not only operational. The examples of all times are conclusive, but especially those of today. This (tactical) level helps operational and even strategic planners and decision makers to always keep their feet on the ground, to understand the tactical fact, the direct action, the extreme risk. Take this into account in the planning, organization and implementation of devices, force projection and cooperation between the two levels, especially in extreme situations. Now, cruise missiles, drones, hypersonic weapons and robots as well as cyberspace have brought the levels of military action very close so that in certain situations they merge (overlap) even if in the configuration of military philosophy and physiognomy, they remain distinct.²⁴

²² *Ibidem*, p.25.

²³ *Ibidem*, p.25.

²⁴ *Ibidem*, p.26.

7. NETWORK BASED WAR

7.1. NETWORK BASED WAR IN THE US

In 1991, the Battle of the Air Force took place in Kuwait - a concept defined by the USA. This concept or doctrine of the USA is the preamble of what will be called the Joint or Integrated Operation. It was first applied in the Gulf War in January 1991, and then in the Iraq War in 2003.

"Force XXI Operations" was defined in Booklet 525-5 of 1994 and referred to the complete digitization of the heavy units of the US Land Forces. The first large unit prepared according to that brochure since 1996 was the 4th Infantry Division, and in 1997 the first field experiments were performed with the first numerical command and control systems. For this purpose, the 4th Infantry Division was equipped with many digital devices and equipment that it mounted on traditional combat vehicles and tested them in field applications with troops. Only with such digitization was the concept of Network Centric Warfare (NCW), or "Network-Centered War" or Network-Based Warfare (NBW) possible. In this war, each officer and non-commissioned officer permanently has an image of his own location, the location of the friendly forces and that of the opposing forces. Digitized systems ensure:

- supervision of information and knowledge of it;
- extension of the operations framework to a wider, non-linear framework;
- the transition from the predominance of direct fire to a combination of direct and indirect fire;
- the constant flow of logistical information.

7.2. APPLYING THE CONCEPT OF NETWORK BASED WAR IN THE ROMANIAN ARMY

Network-based warfare can be applied in information-type societies that benefit from high technologies made by their own means. The armies have two options: either to apply the NBW or to find solutions to counter it.

The NBW concept is a new revolution in the military field. This concept cannot be applied without a high-tech culture.

Information Technology (IT) is also applied in Romania, where there are computer networks. The Romanian Army benefits from some modern command and control systems and every Romanian soldier knows how to work on the computer.

Not all the conditions are created - first of all economic-financial necessary for the application of the NBW concept. In order to ensure the minimum conditions for the application, in stages, of the NBW concept, a thorough analysis is needed on the relationships between the real high-tech possibilities of Romania and the high-tech requirements of the concept.

Digitization of information flow involves the transition from natural to binary, logical languages, so that the information flow benefits from the very high speed of data transmission, the huge capacity for storing and processing information, the quality, fidelity and security of digital communication systems.²⁵

Connecting current systems to computer networks is an imposed solution because not even the US has allowed itself to give up existing systems, thousands of means of combat and immediately create new ones - digitized, but digitized old combat systems. We did the same with the MIG-21 plane that became the MIG-21 Lancer or with the IAR-330 helicopter.²⁶

Only those means (sensor and weapon systems, etc.) that can be transformed in accordance with NBW requirements and that are compatible in performance with NATO systems need to be digitized.

The realization (acquisition) of new digitized systems would be the ideal solution within the available resources. For the implementation of the NBW concept in the Romanian Army, a technical project will be elaborated based on the strategic project in which the central element will be digitization. We already have a model that works, called ASOC, but digitizing the NBW components of the network structures of the entire information flow means much more.

Adding digitized components to existing systems and platforms is the easiest way to connect existing battle platforms and operating systems to core networks as a first step. Those existing systems and means should be chosen to be subject to such additions. It is not advantageous to equip a

²⁵ M. Popescu, V. Arsenie, G. Văduva, *op. cit.*, p.307.

²⁶ *Ibidem*, p.308.

morally obsolete cannon with a "Pentium" system if that manual cannon has no future.

7.3. MULTIPLE DESTINATIONS SENSORS

The sensor systems in the Romanian Army correspond only to a small extent to the requirements imposed on the sensors in the NBW concept. Most are low-performance analog sensors. The only high-capacity, NATO-compatible sensors are FPS-117 radars and systems mounted on upgraded aircraft, as well as DET-2 dosimeters. In the Air Force there are AA radiolocation stations covering the middle and low RAA-KUB area, AA GHEPARD and OERLIKON systems.

The establishment of the sensor grid and the sensor system required by the application of the NBW concept in the Romanian Army depends on the model adopted, the doctrine of implementation and use of the concept, the assistance provided (European, American or combined) and the resources to be chosen, will be allocated.

The system must include sensors for: observation and surveillance of air, sea and land space; cyberspace surveillance; observation and monitoring of own systems and networks; weather sensors, NBC; friend-enemy identification and sensors with multiple functions and destinations.

The endowment of the Romanian Army for the NBW concept implements the following principles: the principle of unity, the principle of the network-based system, the principle of compatibility, the principle of priorities and rescheduling; the principle of completeness; the principle of standardization; the principle of modularity; the principle of efficiency and the principle of continuous upgrade / renewal and updating.

7.4. FUNDAMENTS OF THE DOCTRINE OF USING NETWORK BASED WAR CONCEPT

The main foundations of the doctrine of using this concept are: political, economic, technological, informational, military.

The principles for joint and combined actions are: The principle of information supremacy; the principle of technological supremacy; the principle of identity of peace structures with those of war; the principle of flexibility; the principle of modularity; the principle of synergy; the

principle of prevention; the principle of rapid and decisive action; the principle of punctual, limited and selective employment.

The main terms with which NBW operates are: informatics; data, data transmission and images; high tech; TI; infrastructure; Database; support bodies; information management; sensors; sensor grid; common operational image; common tactical image; information vectors; shooters; digitization of information; networks (central network, physical network, virtual network, platform network; server, network management).

7.5. STRATEGY OF IMPLEMENTING THE NETWORK BASED WAR

Implementing the RBR concept is a politico-military option. The most important arguments justifying such an option are:

- NBW is part of the information society.
- Sooner or later most modern armies will build their C4I2SR networks according to the American model.
- In the medium term, the Romanian Army will also materialize the implementation of this concept.
- The introduction of this concept can be done simultaneously in the sphere of management (command-control) and in the sphere of action by endowing the battle platforms with the equipment and software necessary to work in such networks.
- System elements (STAR, ASOC, digital elements, software for C4I, state-of-the-art processors, etc.) as well as platforms in the Romanian Army must be analyzed by structures and categories of forces according to the requirements of the operational concept and results.
- In the configuration of some variants of organization and endowment of the Romanian Army and in the establishment of the NBW model, one can start from two convergent directions (the experience of the US Armed Forces and the identification and analysis of risks, threats and vulnerabilities).

In order to apply the NBW concept in the Romanian Army, the following steps must be completed:²⁷

- Knowledge of the concept;

²⁷ M. Popescu, V. Arsenie, G. Văduva, *op.cit.*, pp. 339-342.

- Identifying the elements that can be integrated in the NBW concept;
- Elaboration of a doctrine for the use of the NBW concept in the Romanian Army;
- Formulation of the joint or combined action model of Joint type based on NBW;
- Making connections between the joint action model focused on NBW and the real possibilities of the Romanian Army;
- Introduction of NBW requirements in the force strategy, in the means strategy and in the operational strategy (in the force structure, in the endowment and training system, in logistics and in the operational concept);
- Preparing the forces that will be introduced in the theaters of operations for the accomplishment of the different missions.

8. REQUIRED RESOURCES

Romania does not currently have all the necessary resources to implement and materialize the NBW concept.

In terms of type and quality, the following resources are needed: human, financial, economic, high-tech, IT, infrastructure and communications structures.

Human resources are very important in applying the NBW concept. It must correspond quantitatively and qualitatively to the selection of the staff needed to develop the concepts. It must also be responsible for coordinating and controlling the operation of information and automated systems.

These categories include:

- graduates of the National Defense College and similar institutions from abroad and who are part of the Parliament, Government and ministries.
- generals and officers who have studied abroad and are familiar with this concept.
- generals and officers with superior tactical and strategic training.
- military personnel specializing in ACT and communications involved in the process of restructuring the army and in the implementation of information / information and communication systems.

- military personnel participating in international missions within NATO and security agencies.

The human resource for the operation of information systems is insufficient and must be supplemented at the level of the central structures and at the level of the other hierarchically subordinated structures with qualified personnel to ensure the continuous operation of the systems. This category includes graduate officers of military and civilian educational institutions with computer and communications training; military foremen and non-commissioned officers graduating from military and civilian institutions and civilian employees with higher and intermediate training in the field of informatics. It is necessary to harmonize the dynamics of the training of military IT specialists with the dynamics of the introduction into operation of the new systems that will operate within the NBW concept. The armed forces must develop their capacity to train technical and operational personnel for NBW systems in their own military educational institutions. Human resources must also be prepared externally (in the USA, UK, France, Italy and Germany).²⁸

The financial resource in Romania is limited considering that the implementation of the NBW concept will cost several billion dollars. Through own effort the financing can be done in 15 years, and with the help of a strategic partner (USA) in 10 years. NATO or EU funding may also be considered.

The high-tech resource is the framework in which such a concept can be implemented. The technology needed for NBW is about to become widespread. It is also present in Romania, but it is not only about the presence of this technology, but also about the Romanian contribution, ie the Romanian high-tech contribution. A rigorous analysis of this contribution and its optimization is a basic condition for adopting the concept. A politico-military decision is needed to establish the philosophy of involvement, dependencies and interdependencies and the coherence of the system. You also need to know the degree of security and a high-tech guarantee, the degree of national involvement and international dependence. How important the strategic partnership in the development of the programs is another issue that needs to be known.

²⁸ *Ibidem*, pp. 342-343.

Information Technology (IT) is the main resource of NBW. Romania has computer networks and a qualified staff, but it does not have financial resources and that is why the IT problem is difficult to solve.

Economic resources are the economic basis of high-tech and IT. The Romanian economy is not able to ensure a national strategy for high-tech. The materialization of the NBW concept cannot be done without the involvement of the economic factor (economic resources).²⁹

However, economists must also be part of the team that will be tasked with developing the doctrine and strategy for implementing the concept. There are two premises for identifying and capitalizing on economic resources: 1) privatizing the production of the necessary elements and 2) encouraging national IT specialists.

Infrastructures and communication structures are being set up, both national and those of the categories of armed forces. Part of the Permanent Transmission Network was built from STAR, and the (mobile) tactical systems were barely discussed. A serious national effort is needed to create databases and authorized access systems to them. The necessary NBW databases can also be made by international transfer from those who hold them based on the agreements concluded with some states, but the national and military effort in this field will be neither easy, nor in the short term, but in the medium term. Creating and efficient use of databases is one of the most thorny issues of NBW. The main problem of creating databases is the standardization of information (codes, unique formats). In the NBW concept, the database already has the meaning of collecting / storing standardized information such as: tables, files of various types, etc. From the point of view of their internal and external location and access, this type of action requires a whole series of problems and aspects. Both the size and the internal and external structure of resources need to be analyzed with great discernment and involve a set of actions (political, economic, diplomatic, etc.) to pursue the use of all opportunities related to the national security interest and defense.

²⁹ *Ibidem*, p. 344.

From the point of view of the direct beneficiary, these resources could be from outside or inside the national defense system, but also from inside the army.

Resources from outside the national defense system can be connected to the implementation of the RBR concept implementation project if such an effort is beneficial for them (financial, high-tech, IT (IT) and other resources) that can have a profit on long term. Their identification and use must be done according to complex strategies, involving employers, NGOs and other structures that could compete to meet the national interest.³⁰

CONCLUSIONS

The resources needed for any war are: human, economic, financial, high-tech, IT (IT), infrastructure and communications structures.

The creation and effective use of databases is a difficult problem of the concept of Network Based Warfare (NBW) where an important place is occupied by the standardization of information: unique codes and formats.

Within NBW, the database has the meaning of storage (collection) of standardized information (tables, files of various types, etc.). From the point of view of the direct beneficiary, these resources can be from outside or from inside the Defense Staff (S.M.Ap.) but also from inside the Army.



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³⁰ *Ibidem*, p. 345.

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