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GIS FOR THE ARMED FORCES OF UKRAINE. TWO COMPONENTS OF VICTORY

***Abstract.** The purpose of the article is to study the peculiarities of the use of GIS, which is used by the Armed Forces, namely by artillery. Interaction regarding the use of high-quality satellite communication and geographic information system was considered. The relevance of the article lies in the analysis of the use of geoinformation technologies for military purposes. GIS "ARTA" was studied, and its main advantages were determined. The problems that can be solved with the help of "ARTA" GIS are considered. Thanks to the use of GIS during military operations, it is possible to improve the accuracy and speed of artillery and missile systems. The practical application of a complex system, which includes GIS and a high-quality satellite communication system, will allow to significantly increase the effectiveness of the use of artillery in modern warfare.*

***Keywords:** geoinformation systems, cartography, artillery, satellite communication, aerial photography, information technologies*

Formulation of the problem.

Modern GISs are used in all branches of the economy and have significant applied value due to their properties. We have examples of the use of GIS in transport, in ecology [1], in real estate [2, 3, 4], in the underground infrastructure of the city [5], in the oil and gas spheres, in the field of health care. GIS are becoming more and more widely used and appear even in those industries where their use was not possible just a few years ago.



Analysis of recent research and publications.

Geographic information system for the armed forces is a critical part of the information technology infrastructure for national security, defense, and intelligence. It integrates data from different sources, allows analysis, study, and access to data, which gives the team the opportunity to have complete and timely information for decision-making.

In modern warfare, GIS is of great practical importance. Software products of the ArcGIS platform and specialized geoinformation solutions from HARRIS are currently used, which are the basis for building a fully functional modern GIS for spatial information management.

Today, in Ukraine's war against Russia, the use of GIS by the Armed Forces of Ukraine allows to gain a significant advantage in certain areas of the front. Thanks to methodological developments related to GIS by such scientists as Volodymyr Shalaev, Yaroslav Sherstyuk, Volodymyr Shipulin, Kostyantyn Meteshkin, the level of GIS development for applied use is constantly increasing [4, 5, 6].

Subject and task of research.

The subject of research is GIS "ARTA"

Tasks for research:

1. To determine the most important technologies in modern warfare for artillery
2. Study the structure of GIS "ARTA"
3. Determine weak and strong qualities of GIS "ARTA"

Presenting main material.

The experience of conducting modern warfare shows that to prepare the prerequisites for our speedy victory, it is necessary to have two very high-quality things. This is high-speed, reliable communication and specialized GIS, which can quickly perform complex tasks in difficult combat conditions.

Already today we can say that two important components of our victory are:

1. Quality communication.
2. Specialized, professional GIS.

The first essential component of winning is the Starlink satellite system. Starlink consists of thousands of satellites in low Earth orbit that provide Internet

services. Since the beginning of hostilities, 5,000 sets of receivers have been delivered to Ukraine, and by June 2022 there will be about 11,000 of them. Satellites are crucial for ensuring communication among the troops and performing tasks for the critical needs of certain types and branches of the Armed Forces.

The second component is the geographic information system GIS "ARTA". The use of modern GIS "Arta" in military operations is currently being very fruitfully studied by specialists and scientists. Because the artillery previously used by the Armed Forces was mostly outdated and very slow. In addition, a serious problem in Ukraine is the presence of many outdated geographical maps. And the State Land Cadaster, intended to solve this problem, is not yet working at full capacity.

GIS "ARTA" has been used by the Armed Forces of Ukraine since 2014 and shows very high efficiency compared to traditional approaches to fire control and conduct [7].

GIS "ARTA" is a geographic information system - an automated command and control system used by artillery.

"ARTA" GIS is most widely used in artillery units. The use of GIS "ARTA" is conditioned by the specifics of planning and conducting military operations, the requirements for actual data, and the urgency of obtaining information about the results of military operations. GIS "Arta" has established itself as a good tool for mobile and stationary command posts, a tool for planning, monitoring, processing, and transmitting the results of intelligence data. The system allows you to strike enemy positions and provides high-precision mapping, using which the military can precisely target specific areas quickly and accurately. Considering dozens of variants of any weapon that is in service with the Armed Forces of Ukraine, GIS ARTA allows you to quickly issue weapons and not give the enemy a chance to escape from the fire.

Let's dwell in more detail on the application of modern technologies in cooperation with the developed Ukrainian GIS.

The Starlink satellite system and Arta GIS software provide almost immediate and accurate identification of artillery targets. The created system allows you to hit enemy positions quickly and accurately, and provides highly accurate map

GIS "Arta" is a software product that receives information about targets from UAVs, intelligence data of the United States, NATO countries, and conventional forward observers and converts this information into accurate coordinates for artillery. Thus, implementing the concept of interaction of geographic maps, objects drawn on them and a database with a module for processing information and issuing signals directly to the means of destruction. Over the past decade, Ukraine has become a real center for development and use of modern GIS in the armed forces.

Figure 2 shows the scheme of work of GIS "ARTA" and its elements [9].

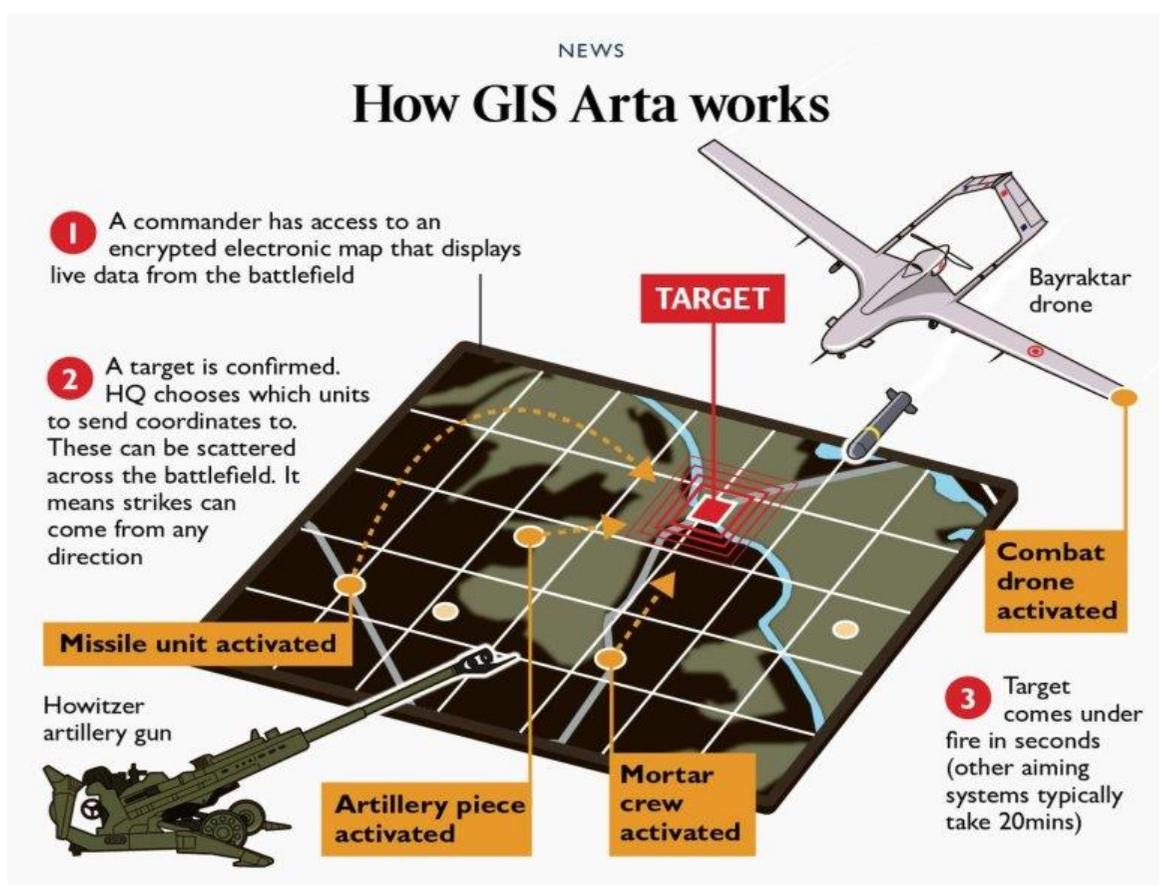


Fig. 2. Scheme of work of GIS "ARTA" and its elements [9]

Usually, it takes 20 minutes to prepare for shooting. Preparation includes the need to program the coordinates of the artillery gun and fire from it. With the help of "Arta" GIS, it became possible to significantly increase accuracy. GIS "Arta" reduces the processing time to approximately 30-45 seconds [10]. No NATO artillery system has such capabilities and ensures such accuracy, which GIS "Arta" offers.

Ukraine also changed the deployment of artillery, separated units at a greater distance to make them more difficult targets for Russian return fire. This also became possible thanks to GIS "Arta". The "Arta" GIS complex also selects which artillery or missile system to use and automatically provides the coordinates of any selected system.

The results. It has been determined that the combined use of satellite communication and geographic information systems is very effective in modern warfare. Thus, Starlink and GIS "Arta" add new technological aspects to the war, the importance of which will only grow in the future.

Conclusions. The Armed Forces received and successfully use a complex system that includes GIS "Arta" and Starlink.

The practical application of this complex system, which includes GIS and a high-quality satellite communication system, will allow to significantly increase the effectiveness of the use of artillery in modern warfare.

References:

1. Olena Pomortseva, Sergiy Kobzan, Andrey Yevdokimov and Maksym Kukhar (2020) *Use of geoinformation systems in environmental monitoring*. The International Conference on Sustainable Futures: Environmental, Technological, Social and Economic Matters (ICSF 2020), Volume 166.
2. Olena Pomortseva, Sergiy Kobzan, O. Voronkov, A. Yevdokimov. *Geospatial Modeling of the Infrastructure Facility Optimal Location* / Second International Conference on Sustainable Futures: Environmental, Technological, Social, and Economic Matters, which held at Kryvyi Rih National University, Kryvyi Rih, Ukraine, on May 19-21. EasyChair . № 5537
3. Kobzan S., Pomortseva O. Real estate market research using GIS. Development trends and prospects. Collection of scientific papers ΛΟΓΟΣ. 2021. <https://doi.org/10.36074/logos-10.12.2021.v3.48>.
4. "Uvekon" geoportal. Retrieved from <https://www.uvecon.ua/ua/geoportal.html>
5. Meteshkin K.O., Shipulin V.D., Nesterenko S.G., Kobzan S.M. *Features of underground real estate use: infrastructural and regional aspects* / GEODESY AND CARTOGRAPHY, Vol. 69, No. 1, 2020, pp. 53–64 <https://doi.org/10.24425/gac.2020.131081>.
6. Shipulin V. D. Basics of GIS analysis: teaching. manual / V.D. Shipulin; Kharkiv. national

university. urban farm - Kharkiv: XNUMG, 2013. - 336 p.

7. Association of manufacturers of weapons and military equipment of Ukraine. GIS Art. Retrieved from <https://audm.org.ua/pidpriyemstva/gis-arta/>
8. HIS ARA. Retrieved from <https://gisarta.org/en/index.html>
9. Asia Time. Mask technology has become a deadly weapon in Ukraine. Retrieved from <https://asiatimes.com/2022/07/musks-tech-put-to-deadly-weapon-effect-in-ukraine/>
10. Artillery mathematics. The story of the developer Yaroslav Sherstyuk. Retrieved from <https://life.pravda.com.ua/ukr/society/2015/11/8/202830/>