

# The use of modern geoinformation technologies in the formation of electronic maps

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**Annotation:** This article provides information on the use of modern geo-information technologies in creating electronic maps, the advantages of creating electronic digital maps, and cartographic sources

**Keywords:** Map, GIS, Global Mapper, ArcGIS, Esri Maps for Office, MapInfo, AtlasGIS.

## Introduction.

Currently, the volume and level of available data is so large that it is difficult to process and analyze them without modern computing and programming tools. Therefore, the creation of automated systems that provide detailed information on natural resources that play an important role in the development of the national economy based on modern computer technologies and telecommunication networks is one of the urgent issues. Today, the use of modern technologies and the automation of work processes are being implemented in the field of management and use of land resources. One such work is technologies for creating electronic cards for land use and management purposes. To date, geographic information systems (GIS) are widely used in almost all sectors of the national economy. In particular, geographic information systems are widely used in agriculture, in the description of the location of agricultural crops, in reflecting the quality of the soil, in carrying out land surveying and in a number of other fields.

Information technology has developed in agriculture and its management enterprises to such an extent that the improvement of work processes in them is becoming a demand of the times. In this case, it is important to convert all existing data into electronic form, to form their database, and to create and work with digital electronic maps based on them. After all, it will be convenient for the user to process, update, edit and perform various other actions on the data and cards in the electronic state [1].

## Main Part.

Modern equipment and programs are necessary to create electronic maps, which are a product of a new stage of geography and cartography. After all, working with electronic maps created using these programs further expands the user's capabilities. Therefore, improvement of map creation is a demand of the times.

The advantages of creating electronic digital maps are:

- development of high-resolution maps for cadastral purposes;
- providing land users and tenants with electronic digital maps of various scales;
- speed of the map creation process compared to the old method;
- availability of data comparison.

and organizations in various sectors of the national economy can use electronic digital maps to solve thematic issues. Including:

- in land registration;
- when making a soil map;
- in drawing up the cadastral map of the users of agricultural (massive) land ;
- during land monitoring, etc.

Creating thematic cards begins with the creation of its geographical basis. All the content of the future card will be downloaded to this geographical basis. The meridian and parallel network, coastlines of water bodies, hydrographic networks, settlements, political-administrative borders, highways and railways, and sometimes relief in special cases are included in the cartographic basis. Theme cards have different contents and are created for different purposes. Some thematic maps are created directly on the basis of field simulations, and

then generalized, and small-scale maps are created: geology, soil and forest maps. Other thematic maps are based on stationary observations (meteorological, hydrological, sometimes ecological), some are based on statistical sources (economic, social and population maps). But thematic maps differ from general geographic maps that cover all or a necessary part of the territory, for example, geological, soil, and agricultural (land stock and cadastre) maps. Thematic cartographic materials are the main sources for creating thematic maps. They will learn the results of the thematic planning in the field, the study of the thematic level of various objectives and scales, the study of the organic and chemical composition of water, underwater animals, the study of the change of the water table, the prevention of floods, the automation of canals, etc. and in forestry, the study of emigration and immigration of all living animals, forest fire prevention, location characteristics of all flora, their development and disappearance, soil salinization in agriculture, chemical composition of the soil and others are used [2].

Several programs are used to create maps using geographic information systems. These include "AutoCADMar", "Global Mapper", "ArcGIS", "Esri Maps for Office", "MapInfo", "AtlasGIS", "Autodesk World", "AutoMap", "BelGIS", "Geo DRAW", "GeoGraf/ We can include GeoKonstruktor", "Geo Media/Geo Media professional", "WINGIS", "MGE (Modular Gis ENVIRONMENT)". Among them, creating a map using the "ArcGIS" program is distinguished by its convenience and advantages.

Maps by field surveying and special surveying such as geological surveying, soil surveying (cadastral surveying), geobotanical, geophysical surveying and other methods and in camera conditions, It is compiled on the basis of various collected sources and data (topographic, survey sources, cartographic, geographical, economic-statistical and other sources). Field maps are also large and medium scale themed maps. Mapping involves three processes that are represented by similar and closely related concepts: designing, editing, and creating maps.

Designing cards includes creating a new card and modernizing existing cards. Card editing refers to the methods of developing editorial documents for card creation and carrying out scientific and technical work in the process of card creation. When drawing up maps, it is understood the method of creating an initial copy of the map, which is a copy that reflects the mathematical basis, the content of the map, and a generalized cartographic description.

to organize and evaluate the work carried out in the process of creating and updating the card . Designing the card involves developing the following technical tasks, developing the general program, developing the mathematical basis of the card, developing the content of the card, conventional signs, methods of representation, preparing an experimental copy and author's model (copy), preparing the card in an easy and high-quality way or includes tasks such as development, planning and implementation of organizational work [3].

The basis of the design of the map program is the name of the area where the map is made, for whom it is intended, the topics of the map, the mathematical basis, the content of the cards, the principles of generalization, the methods and forms of representation, statistical and cartographic resources, the order of their use, and the processes of the card preparation technology. includes.

At the stage of map design, the goals and topics of maps and atlases, preparation of layout composition, identification of cartographic and other sources, classification and identification of details and objects, events and phenomena depicted in the content of the map, development of conditional signs is carried out.

The legend is very important in creating a card, that's why the legend is also called the key of the card. Because it reveals the contents of the card. Before reading the card, get acquainted with its legend. The legend of the card is developed together with the card program and supplied with a copy of the card design. In the development of the legend, conditional symbols should not only match the content of the card, but also be logically complete, simple, easy to read and short.

As we mentioned above, card editing refers to scientific and technical processes at the stages of card creation and the development of editorial documents for creating a card.

During the production of the card, some processes and technological steps may not be used at all. It is possible to improve the quality of work and perform it faster with the use of photomechanical method in some manual work, automation or computerization in some operations .

Making a card means making a copy of the initial design of the card, while the preparation of the mathematical basis is generalized to determine the content, and a copy drawn on paper is included in the process of making a card.

Creating a copy of a card is a very complex and responsible job. When preparing a copy of the map, based on the rules, the creation of a cartographic basis, the preparation and use of cartographic resources, and the representation of the image on the map are carried out. There are three types of cartographic sources:

1. Main cartographic sources;
2. Additional cartographic sources;
3. Auxiliary cartographic resources.

When mapping a cartographic image to a map, resources are divided into primary objects and secondary objects.

The special content to be drawn on the map is selected one by one from the cartographic sources, and these are first described.

The notes on the card are written in special fonts depending on the content of each item. When describing the content on the card, attention is paid to the principles of generalization. When creating a map, it is necessary to distinguish between general geographical maps and thematic maps. Because their content is different.

Preparing a card for publication is a separate process, and making a copy for publication is considered more complicated. In this case, a separate copy is made for each element of the card's content. For example, a copy of the lines, in which only the lines of rivers, railways and highways, borders, punches are given. In addition, there is also a copy of the records, and only the records are given. Sometimes replicas of relief guns are also made. As many different colors as there are in each copy, as many different lithography models (colors) are made [4]. For example, in the copy of the lines, water bodies are drawn separately in blue color, communication paths are separately drawn in black color, horizontal lines are separately drawn in brown color, and punches are drawn separately in red color. Special printing copies are made to check that the printing copies are drawn correctly and to match each geographic element.

Recently, in cartography, automation has been widely introduced in map creation and publishing. Automatic devices, the process of determining the geographical coordinates of points and writing them down on paper, are used for drawing minute and kilometer grids of topographic maps, collecting geographical names on geographical maps and writing them, and drawing uncomplicated analytical maps.

Today, computer technologies are becoming an integral part of human economic activity. It is impossible to ensure social and economic development without putting such technologies into practice. Computerization and automation of every field, first of all, eases human labor, ensures fast and stable management, protects the interests of the state and people, and creates opportunities for consistent development. With a deep understanding of this, it is desirable to organize the work process in an automated manner in geographical research, including the creation of landscape maps. It provides various information in a digitized form and has the ability to collect, study and analyze the necessary data.

Currently, the introduction of the most important, active and extensive informational computer technology in all areas of the national economy, including the use of computer technology as a collective technical tool in geography, geoecology, ecology and other areas, logically aggregated information base and creation of banks, elimination of the need for electronic copies of geographic maps through the geographic information system (GIS) is the demand of today's era.<sup>1</sup>

It is known that information about the geographical location of a certain object is important for representatives of any field. As a result of the rapid influx of various information into our daily life, the application of new techniques and technologies to the production, the tasks of improving the mathematical basis of maps, creating cartographic projections using GIS programs have been set crosswise.

the first time, the concept of a geoinformation system appeared in Canada in the mid-1960s, and it was called the Canadian Geographic Information System (CGIS). In other literature, the geoinformation system is referred to by its full name as a geographic information system or GIS for short. The main purpose of the

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<sup>1</sup>Mirzaakhmedov H., Akaboev I. Advantages of using the geoinformation system in creating thematic maps // Proceedings of the scientific-practical seminar of the Association of Geographers of the Fergana Valley. - Namangan, 2015, pp. 165-167.

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system was to conduct an inventory of Canadian land resources and, based on this, to determine the current state of land resources and their potential in the future.

GIS is primarily a modern computer technology that serves to create maps that help to analyze events and collected data and accelerate the decision-making process in almost any field. Using modern computer programs in GIS, it is possible to speed up the process of data analysis, comparison and creation of maps, and to achieve an increase in the quality of work. It is difficult to imagine GIS today without modern computer technologies, because the faster computer programs develop, the faster GIS develops. Any practical analysis performed by GIS is done through computer programs. Through GIS, we can collect data, analyze spatial data, combine them, visualize them, create new information from existing data, and solve various other district problems. For example, the analysis of spatial data or the creation of maps is not something new, of course, mankind has been creating various district maps for the purpose of improving their lives, but the creation of such maps and the analysis of spatial data in GIS different from the functions performed. The difference is that in GIS, the process of spatial data analysis and map creation through modern computer programs is dramatically accelerated, and the final result is obviously of high quality. Through GIS, we will have the opportunity to dramatically operationalize the decision-making process, in particular, forecasting, simultaneous analysis of several different databases, is possible.

GIS stores collected geographic information about an area in the form of thematic map layers. These cards are grouped and linked to each other based on geographic location. In fact, each of these layers can be considered as thematic cards and they are explained with the necessary information. We will be able to use cards depicting these events, each layer separately or as a card with several layers (Abdulqasimov et al. 2014).

In mapping, the geographical location of the territory, its size, the shape of its boundaries, the purpose of the map, the field of preparation, scale and content, the tasks to be solved by the map and the requirements for the accuracy of the map to solve them, the error characteristics of the cartographic projection and their maximum amount and distribution it is required to know the character and so on. Then, based on these, suitable GIS programs are selected.

GIS is such a class of existing information systems that include events, activities, or their location, i.e., description, along with their details.

The role of GIS in the field of land resources management is extremely large, and with the help of this system, all legal, economic and geographical information about land plots is collected, processed with the help of programs, and their description is carried out using an automated system. Such a system, in turn, creates a basis for saving time and, of course, quality of work. In addition, using the system, storing digitized data and analyzing it in the future provides great convenience to the user. The Canadian Ministry of Environmental Development was the first country to feel the need for such a system. At that time, they introduced the concept of a geoinformation system, and later, with the development of computer technologies, they continue to develop the geoinformation system closely.

The main tasks of the geoinformation system are to create an automated digital database by collecting and processing spatial data and storing it for future analysis and printing. Experts call the Geographic Information System Geoinformatics for short. Geoinformatics consists of three roots: geography, informatics and automation concepts. In the English language literature, there are concepts of "Informatics", "Computer Science" and it includes the development of electronic computing machines, programming, applied mathematics, operating systems and other concepts. The term geoinformatics became more widely used in the late 1980s, and now the term Geographic Information System, or GIS for short, is widely used in the English scientific literature.

In addition to the usual technology of creating maps called "Paper", computer technology of creating maps using Geographical Information System (GIS, then the word GIS is used in the commonly accepted expression) is developing rapidly in recent years.

Simply put, GIS is an automated system that provides topographic, geodetic, land, water resources and other cartographic information about objects and phenomena of nature and society, their processing, storage in EXM memory, updating, analysis, and further processing. it can be described as a hardware-software complex [5]. Consider methods of data collection, processing, storage, updating, analysis, and performing these processes by means of a computer or special software hardware capable of adequately processing the image properties.

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Therefore, GIS is a well-developed system that relies on a comprehensive database of natural networks collected by various methods.

### **Conclusion**

The use of thematic maps in economic geographical research and mapping of processes according to the research results is one of the main methods of scientific research. In agricultural research, using thematic cards to describe information related to the use of land resources, production and technological processes on the card will greatly increase the practical and scientific value of the research. After all, mapping is one of the most effective methods of zoning regions according to the effective use of land resources related to agriculture, the form of organization of agricultural production, natural and economic conditions and specialization. Thus, by creating a system of thematic cards, it is possible to reveal the information-resource potential of regional information, etc., and to determine the necessary inter-sectoral balance. With the help of agricultural cards, the distribution of events and phenomena in space and time is represented visually, the territorial location and specific characteristics of its branches are compared, and scientific analysis is created.

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