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DIGITAL CARTOGRAPHY AND ITS TODAY'S ROLE IN COMMUNITY

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ABSTRACT
The article describes in detail the features of digital mapping and its current role in society. The research and analysis of analog mapping with digital. All previous and present possibilities of various methods of building maps are compared, including the economic component of market efficiency.

KEYWORDS: Geoinformation systems (GIS), geodatabase, Analog cartographic images (AKI), Digital cartographic images (DCI), generalization, attributive.

INTRODUCTION

The beginning of digital cartography can be counted from one thousand nine hundred and fifty-seven. This year the Massachusetts Institute of Technology (USA) produced the first digital model of the terrain and terrain of the map, which was later used for designing roads. This indicates that in the cartography from the mid-twentieth century, new technological card-making and card-publishing processes and methods began to develop, which are being improved to date. The main areas and trends of improvement in them can be identified:

- technological (electronic) methods for creating maps;
- digital ways of organizing banks and databases;
- technologies of geographic information mapping;
- formation of cards in computer networks;
- development of virtual mapping.

For more effective application of scientific and technological processes for the development of cartography, the fastest delivery of the products created by it to the end user is required. Then they will be quickly used by consumers to solve their specific problems. In modern realities, all research and production sectors, including digital cartography , are oriented toward satisfying such requests and the needs of society. Thus, with the help of digital technologies, cartography is transformed from cognitive and simply means of orientation into mathematical tools and methods of design, organization, management and planning. It is already obvious that technological advances have influenced the use of maps, of which we highlight the following:

- communication methods;
- spatial information;
- system decision making.

A STUDY OF THE BENEFITS OF DIGITAL CARTOGRAPHY WITH A TAX

Comparing all the previous and present possibilities of various methods of building maps, including the economic component of market efficiency, we can distinguish the following advantages of digital mapping:

- The transmission of accurate information about the object, virtually eliminating the possibility of errors, due to the use of computer automation in the calculations;
- The speed of processing and obtaining the final result with higher labor productivity;
- A more economical way to create maps with less labor;
- The possibility and convenience of both editing and periodic updating of maps on the same mathematical and geodetic basis.

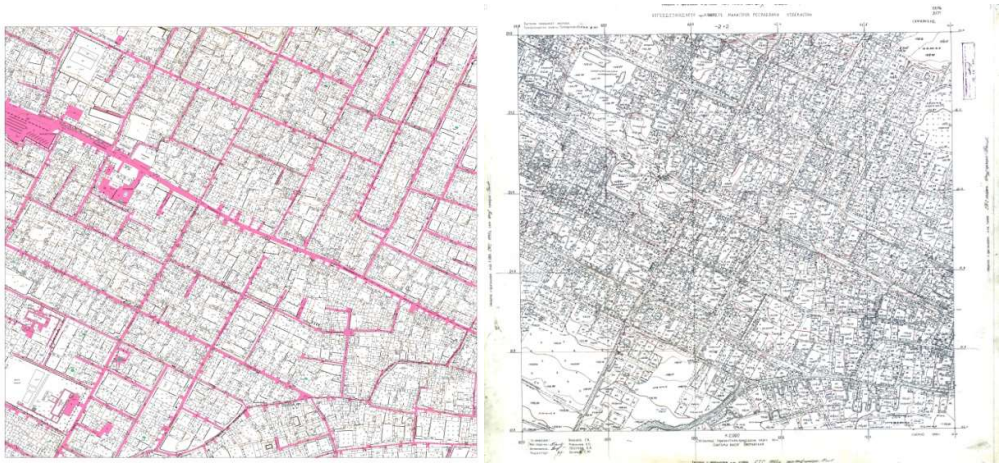
It should also be noted that digital cartography is increasingly occupying a place in the global information flow, penetrating into various areas of the interesting modern life of the planet and gaining significant layers of users of its products, thereby creating increased demand. This situation occurs as it develops:

- New (computer) technologies of cartographic and geographic information systems (GIS) ;
- New (space) methods of geodetic spatial positioning and determining the location of all objects;

- Improving e-mapping, increasing the accuracy and speed of development of new popular cartographic products.

Analog cartographic images (AKI) are the main element of traditional maps and serve as a direct source and storage of geoinformation. They are intended for the direct perception by a person of information about the spatial properties of the world around us and the solution of many problems associated with the location of spatial objects.

Digital cartographic images (DCI) are a means of visualizing a digital cartographic model, that is, a computer model that displays real-world objects using the cartographic method, but presented in digital form. They are also necessary to ensure human perception of the results of computer analysis and processing. Thus, the DCI serves as a kind of interface between a person and a machine [3]. Consider, in comparison, the properties and parameters of analog and digital cartographic images. Fragments 1 shows samples DSI and DSI



Samples DSI Samples AKI

Fragment 1.

The cartographic image is a thumbnail image of the territory. The degree of reduction is characterized by the scale, which is the aggregate parameter of any cartographic image, combining the content, as well as the detail and accuracy of the display of spatial objects. A significant difference between the DCI and the AKI is the ability to change the DCI scale by the user, and these changes on the vector map are limited only by visual perception, and on the raster map the scaling limit is set by the spatial resolution of the raster.

AKI, located on one or more sheets, has limited final dimensions. DCI is limited only by the size of the monitor, but at the same time it is possible to move the image in a wide range. The detail of the image on the raster image (analog and digital) depends directly on the creator of the map and the size of the map. DCI of a vector map changes depending on the needs of the user (the ability to connect various thematic layers).

Any cartographic image is constructed according to the mathematical law of projecting a spherical surface onto a plane, i.e. using a cartographic projection. The projection of the bitmap on the analog and digital map is fixed. The projection of a vector map can be easily changed using software tools included in the arsenal of geographic information systems.

The cartographic image is a generalized, i.e. generalized image. Due to the physical limitations of the analog cartographic image, it is necessary to generalize the objects represented on the map. As a result, there is a decrease in the amount of information that can be obtained by working with an analog card. When working with a vector digital map, the user has the opportunity to use all the information stored in the geodatabase, and visualize only the information necessary to solve a specific problem.

The cartographic image shows the placement of spatial objects and their properties (semantics) by means of graphic codes - conventional signs. [4] A significant difference between the conventional symbols on the

graphic card and on the bitmap image is their static character. The symbols of the DCI of a vector map are a reflection of the semantics represented in the digital model of the map by computer codes, and can be either static or dynamic (change color, size, shape, position).

A raster cartographic image (RCI) is static. DCI on a vector map, in contrast to RCI, gives us the opportunity to use the dynamic symbols and animations to show the occurrence, development, change in time and movement in space of various processes and phenomena. The best opportunities for dynamic geoinformation mapping are represented by modern animated computer programs that create cartographic animations: – Moving a cartographic image on the screen at different speeds; Cartoon sequences of frame cards;

- Moving individual content elements on the map;
- Change in light or background;
- Scaling (zooming) of the image or its part;
- Create a motion effect over the map.

Dynamic geo-images add a much-needed time aspect to traditional static maps. In this regard, the concept of a time scale (time scale) is introduced. This gives rise to new for geographic information mapping problems of temporary generalization, the development of the principles of perception of animated geo-images. [5] Therefore, the digital cartographic image in geographic information mapping has a number of distinctive properties and advantages [Table 1] compared to analog, which require further study.

Table 1. Distinctive properties of analog and digital cartographic image

Cartographic Image Parameters and Properties	Analog Cartographic Image	Digital cartographic image (raster format)	Digital mapping picture (vector format)
What is a cartographic Picture	Geoinformation storage sources		Geoinformation visualization tool contained in the database, which is the source and storage of geoinformation
Content when creating	Limited by image resolution		Limitations only to the purpose of the card
Contents when using	Constant		May change (work with thematic layers)
Scale	Fixed	It is possible to change, but within the spatial resolution of the raster	You can change any limits
The size	Limited to a sheet of solid media (plastic paper)	Limited by the size of the monitor, but provided with the ability to move the image in a large range	
Cartographic projection	Constant		It is possible to change
Generalization	The amount of geoinformation decreases		Geoinformation reduction in the database does not occur
Attributive (semantic information)	It is laid down in the system of conventional signs, while its volume is limited by the resolution of the image		Stored in the database; can be numerical, text, sound, graphic video. At the same time, its volume is practically not limited
Conventional signs	Static		Dynamic

Particular consideration is required by the changes that are taking place in modern conditions regarding the use of analog and digital cards. Before the widespread use of GIS, analog maps were used to solve various problems. With the development of GIS, the need for analog maps decreases sharply, digital and electronic

maps come to the fore, without which it is no longer possible to fully develop many economic areas, such as communications, transport systems, public utilities and many others.

Digital and electronic maps, animated geo-images are increasingly used on the Internet to transmit spatial information. Thanks to the development of operational mapping, the necessary information quickly reaches the consumer via the Internet. This is of great importance for the prevention and liquidation of emergency situations, as well as in the media. Also, CRPs are beginning to be widely used in cell phones and GPS-navigators to determine the spatial position.

CONCLUSION

Thus, with a constant increase in the need for a variety of information, including spatial information, the main task for GIS specialists is to improve the quality and increase the distribution of digital cartographic products. And this in turn requires an appropriate theoretical justification.

Further improvement of the methodology and technology, taking into account the development of software and hardware, will make it possible to rationally organize the production of cartographic products using GIS .

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