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SECTION 8. Architecture and construction.

MOTOR ROADS AND GEOGRAPHIC INFORMATION SYSTEM

Abstract: *The article discusses the meaning of geographical information systems and scopes its use. The presented technology represents an innovative approach to solving problems quickly and efficiently, Because the system is based on data collection and analysis. Discusses the various areas where it is possible to use this technology and its use efficiency.*

Key words: *Motor road, Geographic Information System, Database*
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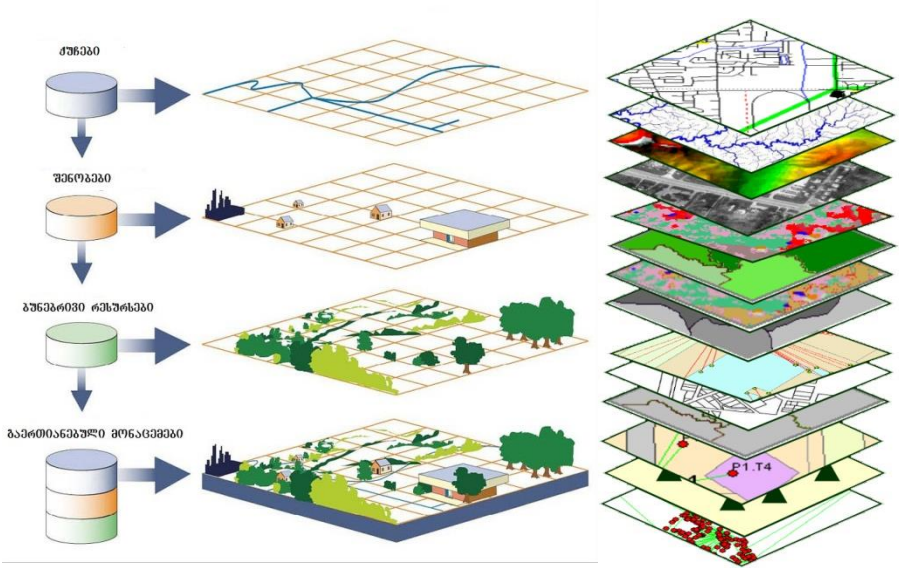
Introduction

Geographic Information System (GIS) is a modern computer technology for analyzing objects, current and forecasted events, phenomena and cartographic data related to positions on Earth's surface. Geo-information systems make most natural mapping of spatial data.

The technology combines the traditional operations carried out while working with databases, requesting for information, and its statistic analyze and analyze of perfect visualization and geographic (spatial) data. This type of feature gives unique opportunities to use the GIS to solve a wide range of tasks related to analysis of events and phenomena, predicting their alleged results and planning strategic decisions.

Materials and Methods

The data is kept in Geographic Information System as a complex of thematic layer (picture #1), which are united on the base of their Geographic location. This flexible approach and availabilities of Geo-information systems to work with both vectored and raster models is quite effective while solving any kind of tasks, relating space information.



Picture 1 - Thematic Layers of GIS System.

Geographic information systems are tightly connected with other information systems and use their data for analyzing. Conformably, the systems can be different: with developed analyzed functions; The ability to manage large volumes of data; with input spatial data, processing and reflecting tools.

Key Advantages of Geographic Information Systems:

- *Convenient reflection of spatial data for users.* Spatial data cartography, including a three-dimensional dimension, is the most convenient way to understand, which makes it easier to build recruitment (formulate questions) and their next analysis.
- *Integration of data within possible organizations or objects.* Systems combine accumulated data of objects or organizations in various subdivisions or in various areas of the whole organization's activities. The collective use of the accumulated data and their integration into the overall information base provide essential competitive advantages and increases efficiency of exploitation of geographic information systems.
- *Making reasonable decisions.* Automation of analyzes and construction of reports on any events related to spatial data gives the opportunity to speed up the efficiency of decision-making procedures.
- *Convenient way for creating maps.* "GIS" systems optimize cosmic and airborne data, information decoding processes processed as a result of scanning and they use existing plans, maps, schemes, drawings, etc. The system essentially saves time resources, while automates the process of working with maps and creates a three-dimensional model of the place.

Geographic Information System, GIS (in Latin as: Geographic Information System, GIS) needs the below given constituents for perfect functioning:

- Equipment (different types of tools);
- Software. The software includes the necessary functions and tools for storing, analyzing and visualization of geographical (spatial) information;
- Necessary data. The data can be presented as ready-made maps including necessary thematic layers, or asteroids and aerial photography images and etc.

In order to ensure the system's proper and free functioning the relevant specialists of different fields should be mobilized to perform precise and faultless integration into the specific information system. For performing operations into the system is required as follows:

- *Data entry.* The process of digital mapping is automated in geographic information systems, which cardinally reduces technological cycle timeline.
- *Data management*. Systems maintain spatial and flat data for their next analyzing and processing.
- *Data requesting and analyzing.* GIS systems perform requests for objects located on the map and carry out automation of difficult process of analysis in a way of contrasting set of the parameters to obtain data or predict events.
- *Data visualization.* Convenient performance of the data directly effects on the quality and speed of their analysis. Spatial data in geospatial systems are presented to be as interactive maps. Reports describing condition of objects can be constructed in graphs, diagrams, three-dimensional images, spreadsheets and so on.

Industrial usage of Geographic information systems. The possibilities of geo-information systems can be put in action in a completely different area of activity. Only a few examples of usage are given below:

Administrative-territorial management. Urban planning and designing of objects; Production of engineering communications, land, urban construction, planting of trees and shrubberies cadasters; Predicting of emergency situations of techno-genetic ecological character; Management of traffic flow and urban transport routes; Construction of ecological monitoring networks; Urban segmentation into engineering-geological districts.

Telecommunications. Track and cellular connection, traditional networks; Strategic planning of telecommunication networks as follows: Antennas, repeaters and others. Selection of optimal arrangement; determining the routes of cabling; Monitoring of network conditions; Operational dispatcher Management.

Engineering communications. Evaluation of demands in water supply and sewerage network; Modeling results of natural disasters for engineering communication systems; Designing of engineering networks; Monitoring of the engineering networks condition and avoiding emergency situations.

Transport. Motor, rail, hydroelectric, pipeline, air transport; Management of transport infrastructure and its development; Management of traffic park and its Logistics; Traffic management, optimization of routes and flow of freight analysis.

Oil and gas complex. Geological intelligence and field exploration work; monitoring of technological regimes of oil and gas pipelines; Designing of main pipelines; Modeling and analysis of emergency situations.

Law enforcement agencies. Rapid Response Services, Armed Forces, Militia, Fire Departments; Planning of emergency assistance operations and defense measures; Modeling of Emergency Situations; Strategic and tactical planning of military operations; Navigation of fast response services and other law enforcement agencies.

Ecology. Assessment and monitoring of the natural environment; Modeling of ecological disasters and analyzing their results; Planning of events for nature protection.

Forest Farm. Strategic management of forest farming; Management of timber manufacturing, planning of approaches to the forests and roads designing; Production of forest cadasters.

Agriculture. Planning of Agricultural Land processing; Registering of landowners and arable lands; Transportation optimization of agricultural products and mineral fertilizers.

Conclusion

Depending on the presented examples, the area is quite huge where this technology can be possibly used. It is very important to prepare specialists of this technological expertise or to enhance the qualifications of the existing staff in order to implement the technology in many directions and most importantly to enhance the country's security.

GIS systems play an important role in maximizing security on motor roads, especially in terms of intensity and flow management. Dangerous areas on the roads can be freely detected and neutralized through GIS systems.

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