



## GEOINFORMATION TECHNOLOGIES IN THE FIELD OF TRAIN SAFETY

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### Annotation

The management of the movement and processes of cargo transportation (including the transportation of dangerous goods) is being improved, multimodal communications and logistics operations are developing, which are unthinkable without regular (often real-time) information about the location of goods on the stages and station tracks, about the time of arrival of the train at the destination.

**Keywords:** local geoinformation, information resources, Uzbekistan Railways.

### Introduction

The efficiency and reliability of locomotive devices using satellite navigation receivers in order to ensure traffic safety (CLUB, MALS, TACK, track measuring cars, "Intelligent Train", etc.) is being improved. The management of the property complex of JSC "Uzbekistan Railways" is being optimized. Prevention of man-made disasters on railways and interaction with the Ministry of Emergency Situations of Uzbekistan, state authorities of the subjects of the Federation and local self-government in the aftermath of disasters and accidents is transferred to the basis of agreed regulations of information and communication and geoinformation technologies.

Specialists of the Institute have developed a software and technology complex for maintaining geoinformation databases of railway transport, which includes software tools for maintaining local geoinformation databases for various purposes, as well as information technologies for using standard geoinformation databases to solve specific functional tasks. A database has been created containing an electronic diagram of the road network, spatial and semantic data on geoinformation objects such as stations (including their large-scale schemes and plans, with explication of structures and technical objects), track profiles, sections and stages indicating trackage and electrification.

For transportation control centers of different levels, a technology has been created for the use of geoinformation resources that increase the illustrativeness of the information received by dispatchers (in particular, on the collective use scoreboard).

Within the framework of the GIS of Uzbekistan Railways, the integration of geoinformation databases of the road level is carried out. The accumulation, storage and use of information about the spatial objects of the network (stations, sites, transport hubs, mineral deposits, power systems, ports, etc.) is carried out in relation to the conditionally large-scale scheme of the subjects of the Russian Federation, CIS and Baltic countries, as well as Europe and Asia. The created GBD contain updated information about major railway junctions, dispatching stations, mnemonic diagrams of stations and water transport nodes, partitioning schemes and power supply of the contact network partitioning. Developments are underway on the use of GIS technologies for multi-criteria analysis of the transport industry, optimization of traffic flows, modeling of strategic directions of cargo flows on the scale of Russia based on the accounting data of automated control systems.



In accordance with the national concept of the creation of the Uzbekistan Spatial Data Infrastructure (UIPD), the issue of the implementation of its segment on rail transport in the form of a unified corporate spatial data infrastructure is also on the agenda. These works are aimed at increasing the relevance of the created GBD, the multipurpose use of the information resources accumulated in them within various functional applications, the typing of GBD and the means of their use, as well as their integration with other information resources both within Uzbekistan Railways and in joint projects with external partners.

Of particular importance in creating the spatial data infrastructure of GIS Uzbekistan Railways is the introduction of uniform standards for the digital description of objects and a single coordinate basis of the industry. In Europe, this task is solved on the basis of the international standard of a single digital description of the path based on geographical coordinates (CNTD).

A single coordinate basis greatly simplifies the integration of spatial data of various departments. It is applicable both when creating station plans, and in routing and logistics, and in property management. Thanks to it and the implementation of standards for the exchange of geospatial information between divisions and various Uzbekistan Railways information systems, duplication of measurements is eliminated, and all divisions are provided with up-to-date high-accuracy data that reduces the risk of errors and improves the overall quality of management.

The information service of users is based on the creation of a corporate geoinformation portal of JSC "Uzbekistan Railways", which uses (via Intranet) the publication of data for exchange and remote access. The same technology is applicable for external publication and creation of an external Internet portal "Uzbekistan Railways", providing interaction with customers (branded service, interactive maps, real-time routing, taking into account changes in the schedule, etc.).

Of particular importance is the creation of a unified corporate automated management and monitoring system for the company's property complex (EC ASU MIC). It is designed to radically improve the management and disposal processes of such important components of Uzbekistan Railways assets as land plots and related real estate. For the information support of this system, a geoinformation database of the register of lands and real estate is being formed.

The task is to accurately describe the boundaries and establish the area of the right-of-way, the boundaries of adjacent plots and their owners, plots located in the right-of-way and owned by owners who are not part of the company structure. An inventory of buildings and property located within the right-of-way is carried out, that is, their actual availability corresponds to balance sheet documents. Much attention is paid to technological solutions for the organization of monitoring the legal status of land plots allocated for construction and reconstruction of railway infrastructure facilities at all stages of the "life cycle" of these objects: from making a decision on land acquisition to cadastral registration with subsequent state registration of rights and the introduction of the object into civil circulation.

The effectiveness of the integrated application of satellite and geoinformation technologies will be ensured by income from reducing the scrap of capital and average repairs of the railway track, reducing the cost of geodetic support for the construction of a new track and reconstruction of the existing track; optimizing the overhaul of tracks based on regular monitoring and analysis of the reliable condition of



the track; reducing the cost of special reference networks of roads by increasing productivity labor on geodetic works.

The high technological effect of the implementation of the considered developments will turn out to be "synergetic": it will be possible to determine in real time the location of rolling stock, the trajectory of the rail track and infrastructure facilities on a digital geographical map in the Uzbekistan Railways GIS system in a single coordinate system, which automatically opens the fields of functional applications for solving various target tasks and the possibility of interaction with other information systems Uzbekistan Railways. The formation of technological trends is deeply natural. It is caused by significant factors of reforming the railway industry. I will name just a few.

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