

Maintenance and Updating of Topographic Maps of the Large Scale at the Municipal Level

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Starting from June 2006, according to chapter 7 of Urban development code of Russian Federation, city Administration handles Information System For Urban development Activities based on Management of Architecture and Urban development together with subordinate municipal budget establishment "Urban development". Lets see in more details the subsystem for handling city's topographic sheets which, together with other modules, is the best to demonstrate the possibilities of complex approach used in municipal management using Remote Sensing Data and economic effect of such approach.

The subsystem for handling topographic sheets of city's territory was put into operation, effective since 2008, and used to manage municipal economy and to provide to city's population and organizations with actual topographic maps with scale 1:500 and more smaller scales. The subsystem entered the top ten world's wide projects with usage of software from "Bentley Systems" and was published in digest "The Year in Infrastructure" of 2013. The subsystem includes full cycle of processing, keeping and providing topographic materials covering whole city's territory to users. Area of the city is more than 420 square kilometers, total amount of topographical sheets nomenclatures is more than 7000 sheets. All processing is performed using digital representation of topographical sheets in vector and bitmap forms. The bitmap images as a file are connected to corresponding graphical tables of DBMS Oracle which are represented as pivot points for each sheet and contain full information about sheet creation and all its modifications. Data from the tables and bitmaps are available to all organization departments of city Administration via geoportal. Geoportal was created and is now functioning based on Bentley software GeoWebPublisher and is accessible for users with proper access. On user request the reports and records are automatically prepared either in digital form with publishing on geoportal or in paper form.

As of results of geodetic surveying the employees of department responsible for making changes in topographical sheets are receiving

digital reports containing measurement data from devices and multilayered vector data covering the survey territory. This data is processed using BentleyMapEnterprise software. Control of geodetic survey results integrity is done using the same software by collating data from other materials, including high definition satellite images and digital elevation model based on stereo images from spacecraft WorldView-1. The result of the work is digital form of the modified topographical sheet. The processing of high definition satellite images, including the image's basic spectrum analysis with objects recognition, and preparation of different analytic schemes to take urban development decisions regarding deploying investment projects is done using ENVI software.

The subsystem provides execution of government programs tasks in scope of public digital services and digital government system of the city (management of municipal economy based on digital technologies).

Total economic effect:

- Allows to handle all city's topographic sheets using 3 employees
- Provides documents for 10 000 requests per year in average
- Reduces city expenses in times due to reduced cost of public requests handling.
- Provides city budget economy in 2 million rubles yearly comparing to handling topographical sheets in paper form.
- Reduces time of topographical sheet modification handling in hundreds of times
- Reduces expenses on full topographical surveys for 3 million rubles per year
- Total effect of using digital evaluation model covering all city area is at least 500 million rubles of relative economic effect.

Usage of modern digital technologies in analysis and decisions for investment projects deployment on city territories gives not only the huge economic effect but provides much higher quality results in real time scale due to synergy of interaction of different modern techniques and other visual representations of the data.