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SOFTWARE PRODUCT

COMPLEX OF MANAGEMENT FOR DATA BANK OF DIGITAL MAPS AND REMOTE SENSING OF THE EARTH
(Data bank of digital maps and remote sensing of the Earth)

Description of application

PARB.00033-03 31 01

15 pages

2020

ANNOTATION

This document describes the application of the software product «Complex of management for data bank of digital maps and remote sensing of the Earth» (Data bank of digital maps and remote sensing of the Earth) PARB.00033-03.

The document is intended for maintenance and operation of the software product «Complex of management for data bank of digital maps and remote sensing of the Earth» (Data bank of digital maps and remote sensing of the Earth) PARB.00033-03.

CONTENTS

1 ASSIGNMENT OF THE SYSTEM

«Complex of management for data bank of digital maps and remote sensing of the Earth» (Data bank of digital maps and remote sensing of the Earth) PARB.00033-03 (hereinafter – Complex) is intended for accumulation, accounting, issuance of geospatial information (digital maps, remote sensing data, matrices of heights and documents), systematization of the metadata for archive of the geospatial information, collective access, display of metadata for the data bank by means of a web browser, creation, maintenance and display of schemes for availability of geospatial information.

The main functions of Complex are:

- accumulation, recording, storage and delivery of digital maps, remote sensing data and matrices of heights, as well as their digital forms;
- input control for the structure of digital maps, remote sensing data, matrices of heights and the completeness of their metadata;
- automatic accumulation and accounting of several versions for digital maps, remote sensing data and matrices of heights;
- search for digital maps, remote sensing data, matrices of heights and documents based on metadata with the possibility of selection (filtering) and display them on the background map;
- issuing the geospatial information at the request of the user;
- forming reports on the availability of materials, data types, storage scales, reports on the date of the state of the terrain, the amount of occupied disk space;
- formation of geo-coverings for the specified territory from digital maps, remote sensing data and matrices of heights;
- automatic transformation of digital maps, remote sensing data and elevation matrices into the specified coordinate system to form a geo-coverage for the specified territory;
- provision of administration for the metadata of data base and archive of digital maps and remote sensing data and authorized access to data on the basis of data security tools included in the operating system;
- creation, automatic updating and display in the specified symbols of schemes for availability of digital maps, remote sensing data and matrices of heights stored in the data bank.

2 OPERATING CONDITIONS

The software product can be executed in 32-bit or 64-bit operating environment of Windows OS on computers with Intel processor architecture.

Recommended requirements for hardware and software of the server:

- processor type Intel Core i3 3.33 GHz or higher;
- RAM from 16 GB and more;
- hard disk capacity of 2 Tbytes and more;
- Ethernet network card with a performance of 1 Gbit/second and higher;
- uninterruptable power source;
- HTTP-server IIS, Apache, or ngnix, DBMS PostgreSQL;
- PHP interpreter version 5 and higher;
- software product GIS WebService SE PARB.00160-01 (included in Complex);
- software product GIS Server PARB.00049-01 (included in Complex).

For PHP interpreter, it is necessary to have installed extensions to interact with DBMS PostgreSQL.

Main types of browsers are supported: Google Chrome, Internet Explorer, Mozilla Firefox.

2.1 Composition and quality of initial materials

To manage the data base of metadata, it is necessary to install and configure the PostgreSQL DBMS.

To display the schemes for the availability of spatial data, the necessary maps in the software product GIS WebService SE PARB.00160-01 and GIS Server PARB.00049-01 (included in Complex) are connected automatically after the installation of the product.

2.2 Personnel

Persons, operating with Complex, should have a secondary special education in the field of cartography, topography, geodesy or related subjects, to have the skills to work with PC as users and to take a course of training in working with Complex.

3 DESCRIPTION OF THE TASK

Complex is designed for the accumulation, recording, issuance of geospatial information (digital maps, remote sensing data, matrices of heights and documents), systematizing of metadata for archive of geospatial information, collective access, displaying the metadata of data bank with the help of a web browser, creating, maintaining and displaying GSI (geospatial information) schemes.

Complex interacts with the system-wide software of MS Windows OS and performs queries on access to various types of spatial data.

Complex has the client-server architecture. The access to the data bank of digital maps and remote sensing of the Earth, and the exchange of data with customers is carried out via a web browser (Figure 1).

Customers need to use the web browser Mozilla Firefox, Google Chrome or Internet Explorer.

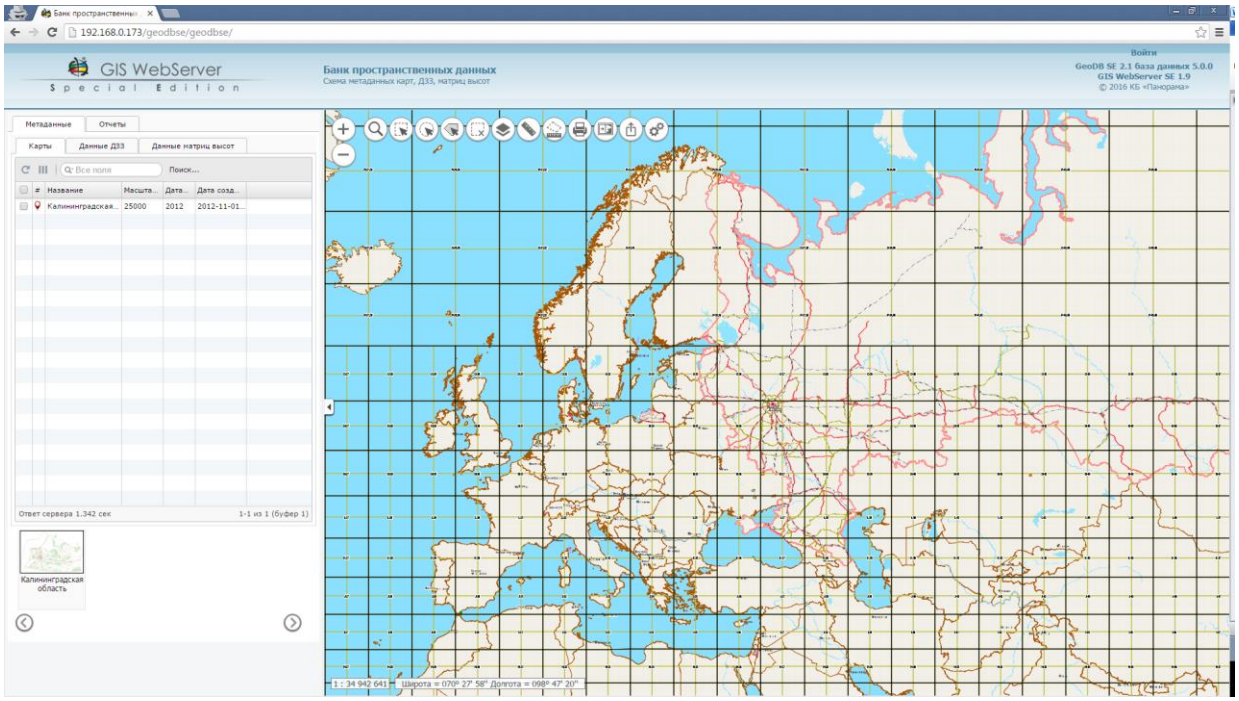

Figure 1 - The main form of Complex

To maintain the data base of metadata, DBMS PostgreSQL is used.

For each data type (vector, raster, matrix maps), it is used a separate metadata table with the predefined structure.

Vector, raster and matrix maps can be placed in the metadata base only if there is a geospatial binding.

Loading of GSI (geospatial information) data is carried out by means of a web browser (see Figure 2) using the transport protocol HTTP. When loading the geospatial information, it is executed the enter control, creating the overview image, updating the metadata and updating the geo-coverage schemes according to their settings, defining the data group to which the addition is made, if it is not manually specified, storing the data in accordance with the data group settings.

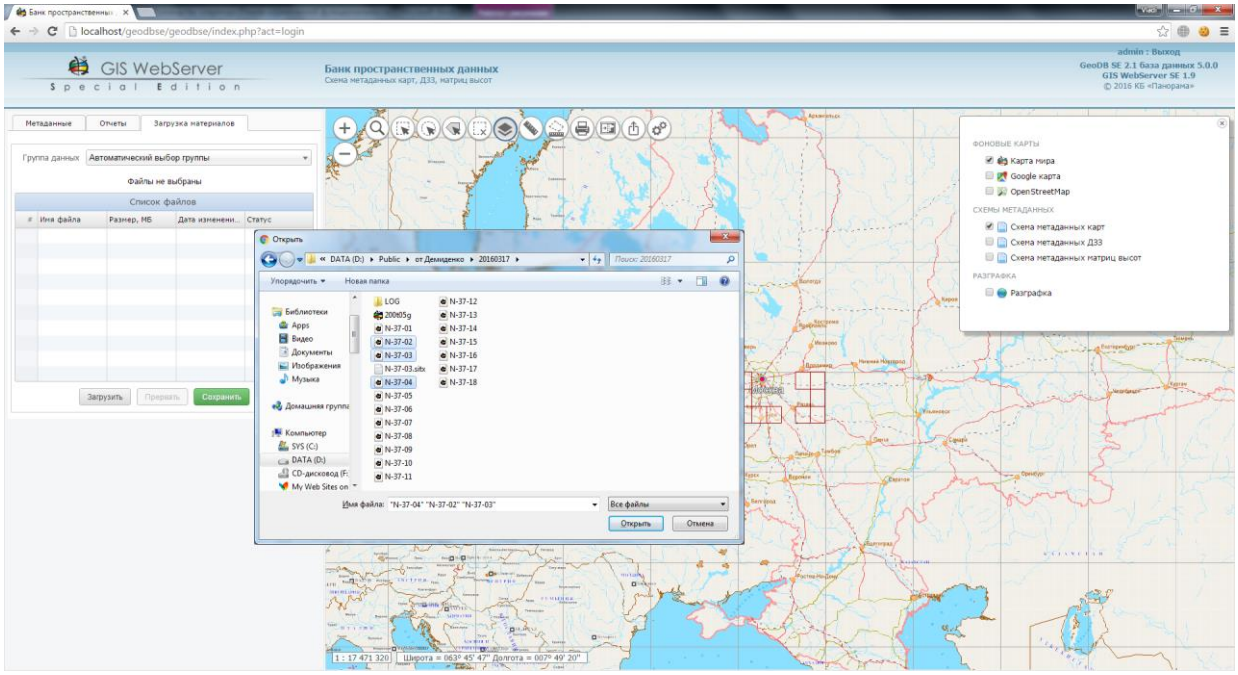

Figure 2 - Form for loading GSI into Complex

The output of GSI is done by creating a zip archive from the selected data. The use of archiving is performed in order to reduce the number of actions when downloading data sets.

To search for metadata, Complex executes queries to DBMS and it displays the result in the form of the table (see Figure 3). It is available as a quick search by the name of GSI and advanced search by attributes.

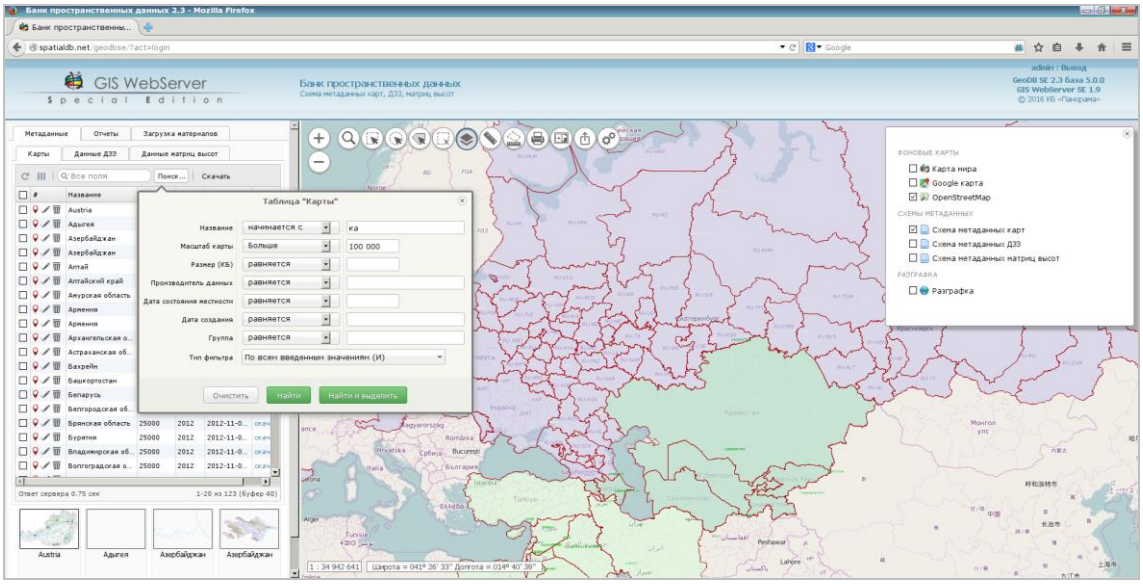

Figure 3 - The advanced search by metadata

For report creating Complex performs the formation of a document PDF on metadata of the bank (see Figure 4) with the ability to select by attributes.

Карты

Название	Дата создания	Регистрация	Масштаб карты	Размер (Кб)	Производитель данных	Местность
Austria	2014-01-16	2014-01-16	25000	631094	OpenStreetMap	2014
Адыгея	2012-11-01	2012-12-19	25000	8468	OpenStreetMap	2012
Азербайджан	2014-01-10	2014-01-15	25000	13701	OpenStreetMap	2014
Алтай	2012-11-01	2012-12-19	25000	6319	OpenStreetMap	2012
Алтайский край	2012-11-01	2012-12-19	25000	22608	OpenStreetMap	2012
Амурская область	2012-11-01	2012-12-19	25000	9226	OpenStreetMap	2012
Армения	2014-01-10	2014-01-15	25000	19622	OpenStreetMap	2014
Армения	2015-02-17	2015-02-20	1000000	676	VMap0	
Архангельская область	2012-11-01	2012-12-19	25000	81853	OpenStreetMap	2012
Астраханская область	2012-11-01	2012-12-19	25000	4278	OpenStreetMap	2012
Бахрейн	2014-01-31	2014-02-18	1000000	53	VMap0	
Башкортостан	2012-11-01	2012-12-19	25000	41665	OpenStreetMap	2012
Беларусь	2012-11-01	2012-12-19	25000	175364	OpenStreetMap	2012
Белгородская область	2012-11-01	2012-12-19	25000	27325	OpenStreetMap	2012
Брянская область	2012-11-01	2012-12-19	25000	24601	OpenStreetMap	2012
Бурятия	2012-11-01	2012-12-19	25000	7663	OpenStreetMap	2012
Владимирская область	2012-11-01	2012-12-19	25000	31812	OpenStreetMap	2012
Волгоградская область	2012-11-01	2012-12-19	25000	43615	OpenStreetMap	2012
Вологодская область	2012-11-01	2012-12-19	25000	35911	OpenStreetMap	2012
Воронежская область	2012-11-01	2012-12-19	25000	41865	OpenStreetMap	2012
Грузия	2012-11-01	2012-12-19	25000	108097	OpenStreetMap	2012
Дагестан	2012-11-01	2012-12-19	25000	9699	OpenStreetMap	2012
Еврейская автономная область	2012-11-01	2012-12-19	25000	2102	OpenStreetMap	2012
Египет	2015-01-12	2015-02-20	1000000	5487	VMap0	
Забайкальский край	2012-11-01	2012-12-19	25000	13570	OpenStreetMap	2012
Ивановская область	2012-11-01	2012-12-19	25000	19071	OpenStreetMap	2012
Израиль	2014-12-18	2015-02-20	1000000	606	VMap0	
Ингушетия	2012-11-01	2012-12-19	25000	347	OpenStreetMap	2012
Иордания	2014-12-03	2015-02-20	1000000	991	VMap0	
Ирак	2013-12-18	2014-01-29	1000000	3217	VMap0	
Иран	2014-01-20	2014-01-29	1000000	16476	VMap0	

Figure 4 - The example of report with the selected type «Maps»

To configure Complex, the administrator page is implemented (see Figure 5). Using this page, it is possible to change the settings of Complex: general application settings, the base of metadata, the choice of formats storage and the composition for groups of stored files, the management of user groups and the differentiation of access rights.

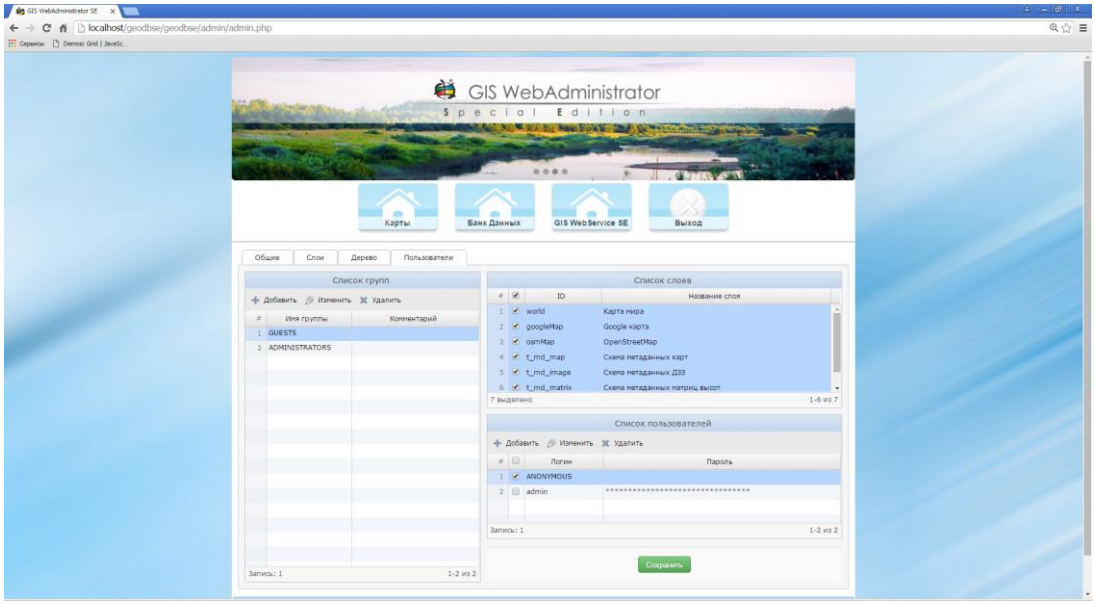

Figure 5 - Page of Complex administrator

When you open or create a base of metadata, the map is created automatically - the content schema of the data base for metadata (see Figure 6). Each type of metadata has a separate map-scheme.

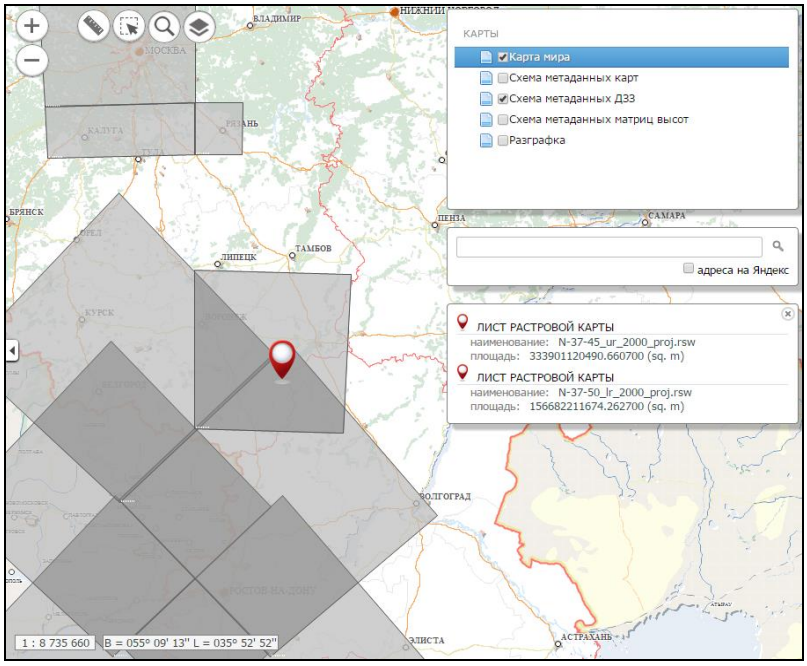

Figure 6 - The example of the scheme for availability of remote sensing data

The map is formed in accordance with the composition of data in the archive and it is displayed over the background map. The map shows the storage objects (areas covered by maps). Vector maps, vector user maps, raster and matrix maps differ in the way they are displayed (designed) on the map. In addition, there are different vector maps of different scales. The background for displaying objects is transparent. As a result, overlapping data of different types and scales can be considered.

Each object on the map-scheme has an inscription with a short name of the corresponding storage object for the data bank.

4 INPUT AND OUTPUT DATA

Complex allows processing the following types of data: digital maps, remote sensing data, matrices of heights and documents. The data is placed in Complex through a web browser.

Parameters of operating Complex and addresses of the spatial data servers are described in the configuration file config.xml in the server part of the program and in the file param.js on the client.

Digital vector maps and city plans can be stored in the following exchange formats:

- SXF (SXF, TXF, DIR, RSC);
- SHP (SHP, DBF, PRJ, SHX);
- MIF\MID;
- GML (GML, XML);
- KML;
- MP;
- DXF (DXF, DBF);
- S57 (030, 000);
- GPX;
- GDF;
- XLS;
- TXT.

Remote sensing data includes materials of air and space imagery of the terrain in a raster form. Remote sensing data and scanned map materials can be stored in the following exchange formats:

- TIFF/GeoTIFF (TIF, TIFF);
- JPEG;
- BMP;
- PCX;
- rasters MrSid (SID, JP2, NTF);
- IMG.

Along with the raster data files, it can be stored the binding files in the following formats:

- TAB;
- «world file» (TFW, JGW, JPGW, BPW, J2W, SDW, NFW, WLD);
- TPF (PHOTOPLAN);
- PLN («Talka»);
- MAP (OziExplorer);
- XML.

Matrices of heights and terrain models can be stored in the following exchange form:

- MTW;
- GRD;
- HGT;
- GeoTIFF (TIF, TIFF);
- MTQ;
- MTL;
- DBF;
- a cloud of points (TXT, LAS, MTD).

The list of stored data formats can be extended by editing the data format directory.

The output data of the program are:

- digital maps, remote sensing data, matrices of heights, documents and metadata issued at the request of the operator;
- data files for vector maps and city plans, remote sensing data and matrices of heights and terrain models;
- digital forms containing metadata of GSI sets;
- report files in PDF format;
- schemes for the availability of digital maps, remote sensing data, matrices of heights and documents, performed in specified conventional symbols.

THE LIST OF SYMBOLS, TERMS AND DEFINITIONS

BMD - base of metadata.
CDM - custom data models.
CSHM - complex of software and hardware means.
DBMS - a database management system.
DES - data exchange systems.
DM - a digital map.
DPC - data processing center.
DTM - a digital topographic map.
GDB - geospatial data base.
GIS - geoinformation system.
GIS - Geographic Information System (GIS).
GML - Geography Markup Language.
GSD - geospatial data.
GSI - geospatial information.
ICS - information cartographic support.
IS - information support.
MAVP - means of antivirus protection.
MIP - means of information protection.
NS - nomenclature sheet.
OOD - the object-oriented data.
OODB - the object-oriented database.
OOM - the object-oriented model.
OS - operating system.
PECM - personal electronic computing machine.
RSE - remote sensing of the Earth.
SC - software complex.
SGPI - set of geospatial information
SHC - software and hardware complex.
SS - special software.
STC - software and technical complex.
SW - software.
UA - unauthorized access.
WDD - working design documentation.
Attribute - the name-value pair contained in the element [ISO 19136: 2007].

Attribute	-	the name-value pair contained in the element [ISO 19136: 2007].
Attributive data	-	a piece of data that characterizes the properties of spatial objects (except for information about their spatial location).
Basic spatial objects	-	digital data on the most used objects of the terrain, which differ in the stability of the spatial position in time and serving as a basis for positioning other spatial objects.
Boundaries	-	a set that contains limitations of some entity [ISO 19136: 2007].
Coordinate data	-	a piece of data that characterizes information about the spatial location of objects.
Data base	-	a collection of data organized in accordance with certain rules and maintained in computer memory, characterizing the current state of a certain domain and used to meet the information needs of the user. The basis of the data base is the data model.
DBMS	-	a set of software and linguistic tools for general and special purposes, providing management of the creation and using of data bases.
Geo-coverage	-	a scheme of the availability of geospatial information, performed in specified conventional signs.
Geoportal	-	a mean for access to distributed network resources of spatial data and geo-services located in the Internet environment.
Geoservice	-	the ability of a geoportal user to perform any actions on spatial data.
Identification	-	the process of assigning a unique value to the attribute of the object that does not coincide with any other value of this attribute from other objects.
ISO	-	an international non-governmental organization engaged in the development of international standards and cooperation in the field of standardization.
Metadata	-	data about the data [ISO 19115: 2003], data describing the content, volume, position in space, quality and other characteristics of spatial data.
PHP	-	a scripting programming language used to develop web applications.
Relational data base	-	a database based on a relational data model.
Scheme	-	a collection of scheme components within a single target namespace [ISO 19136: 2007].
Server - (hardware)	-	a computer dedicated to performing certain service functions.
Server - (software)	-	software that receives requests from customers.
Spatial data	-	digital terrain data and geographic and anthropogenic objects located on it, including information on their location, form and properties, presented in the coordinate-time system.
The data dictionary	-	a list of data describing the semantic content and form for the representation of entities and metadata elements, the rules for filling them, as well as a set of possible values for metadata elements [ISO 19115: 2003].
The data model	-	a fixed system of concepts and rules for representing the structure, state, and dynamics of a problem area in a database.
The data set	-	an identifiable collection of data [ISO 19115: 2003].
The essence of metadata	-	a set of metadata elements that describe the same aspect of the data [ISO 19115: 2003].
The metadata element	-	a discrete metadata unit [ISO 19115: 2003].
The object-	-	a database in which data is modeled as object models, including application

oriented database		programs that are controlled by external events. Such database is usually recommended for cases where it is required high-performance processing of data having a complex structure.
The spatial object	-	a digital model for material or abstract object of the real or virtual world, with an indication of the identifier, the nature of the localization, the positioning of the object and its attributive data.
The unitary electronic cartographic basis	-	a digital cartographic image that is the backbone (substrate) for combining with the image of other spatial data or creating spatial data.
Unified resource locator (URL)	-	a standardized string of characters indicating the location of the resource on the Internet [ISO 19115: 2003].
WEB-publication	-	a form of data representation for display on the Internet.

Change log sheet

Changes	*Numbers of sheets (pages)*				*All sheets (pages) in document.*	*№ docum.*	*Incoming №. escort-tional document and the date*	*Signature*	*Date*
	changed	*replaces*	*new*	*cancelled*					