

Implementing a Cadastre in Internet in Poland

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Key words: cadastre, Internet access to cadastre

SUMMARY

In Poland cadastre is maintained on a district level (each province is divided into district units in Polish "powiat" which consists of one or more communes). There is no unified standard of cadastral software in Poland, only standard of exchanging cadastral data exists. In this connection there is over 30 software solutions used in cadastre (only 7 with descriptive and cartographic part of cadastre integrated in one relational database) and amount of cadastral databases is closer to the amount of district's units (over 370). In this group there is some districts which implemented modern cadastral software solutions, which allow to distribute cadastral data through internet. One of the pioneers in this field is „Warsaw West District” which implemented three modern cadastral solutions. First is an internet accessed cadastral map integrated with base map, control points' database and ortophotomaps. Many elements, including cadastral map is freely available for citizens. Second solutions is system designed for internet access to descriptive part of cadastre and now is in use for employees of communes covered district (only-because of personal data protection act). Third system is an internet accessed register of the properties sale's prices and values of properties came from documentation made by valuers for citizens for single properties (not from mass valuation process). System is in last phase of implementation (updating of the database) and will be available for land brokers and valuers (only-because of personal data protection act). In paper there are described those solutions in connection with current legal conditions in this field in Poland.

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1. INTRODUCTION

Following the act of May 17, 1989 – Geodetic and cartographic law (Dz. U. 2005, No. 240, item 2027), real property cadastre and soil classification of lands are implemented by starosts (Art. 22) and presidents of cities (playing the role of districts), as one of the tasks of the governmental administration. In particular cases, the cadastre may be maintained by mayors or presidents of cities.

Tasks related to computerisation of the cadastre are the responsibility of those bodies, which maintain the cadastre.

34 various software solutions are used to maintain the cadastre in Poland (12 software solutions are used to maintain the descriptive part only, 15 packages – for the graphical part only and 7 integrated packages are used to maintain both parts of the cadastre) (as for January 1, 2006) (GUGIK,2006). The standard of cadastral software – one software tool for maintaining cadastre has not been introduced in Poland yet.

Dominating software solutions, used to maintain the descriptive, as well as the graphical part of the cadastre may be distinguished in Poland, however, local solutions, which occur in one district only, may also be noticed. Software packages, which ensure integration of geometric and descriptive data, by means of recording this data in one database, have been implemented in some districts – at present, 7 such software packages exist (in 47 districts) (GUGIK,2006). Remaining software tools are used for maintaining the descriptive part of documentation of cadastre or to maintain the cadastral map; some of respective pairs of those software tools ensure integration of the descriptive part of cadastre with the cadastral map by means of an application interface (such solution is applied in 80 districts). In other districts integration of the descriptive part of cadastre with the cartographic part has not been ensured yet. (GUGIK,2006)

2. RULES OF ACCESS TO CADASTRAL DATA IN POLAND AND POSSIBILITIES TO DISTRIBUTE THIS DATA INTERNET

In Poland the act of August 29, 1997 on personal data protection (Dz.U., 1997 no. 133, item 883), as well as related legal acts.

Some important articles of that act are listed below:

1. everyone has the right to protect his/her personal data (Art. 1),
2. as understood by the act, personal data includes each piece of information concerning an individual, which allows to determine the identity of a given person (Art. 6).

3. an administrator of data should take particular care in order to protect the right of individuals described by the data, and, in particular, the administrator is obliged to ensure that the data are: (Art. 26):

- processed according to law,
- collected for specified objectives, according to law and not further processed for other purposes,
- substantially correct and appropriate for the purpose of the data storing,
- stored in a form allowing for identification of individuals, to whom they are related, not longer than it is required in order to achieve the objective of data processing.

4. The data administrator is obliged to utilise technical and organisational means to ensure the protection of processed personal data, and in particular, to protect data against unauthorised access, taking away by an unauthorised individual and against damage (Art. 36).

5. Only individuals who are authorised by the data administrator may be allowed to maintain the computer system and its components, using for data processing (Art. 37).

6. The administrator of data processed by the computer system is obliged to ensure the control, which personal data, when and by whom was introduced in the system, to whom it is transferred, in particular, when the data is transferred by means of tele-transmission installations (Art. 38).

7. The data administrator registers all individuals involved in data processing. Individuals who have the access to personal data are obliged to consider the data as secret. This obligation is also valid after the period of employment (Art. 39).

In general, the above act concerns personal data in various systems. The rules of access, related to the access to cadastral data, which consider limitations resulting from the act on personal data protection, are included in the legal act of May 17, 1989 – The geodetic and cartographic law. The discussed issues are regulated by Art. 24 of this Act, which says, that:

1. Information on lands, buildings and premises, included in the cadastral documentation are open to public. Access to those information is charged by a special fee.

2. Extracts and official copies of the cadastral documentation are issued by the body, which maintains the cadastre, for a special fee, following requests of owners or individuals of legal entities, which possess the lands, the building or premises, or following requests of individuals, legal entities and other organisational units, which are not legal entities, which has the legal interest in the related scope, as well as following requests of interested bodies of governmental administration and local government units.

3. The Starost ensures, free of charge, the direct access to the database of lands and buildings registration to the following entities, excluding the right to distribute them to the third parties:

- To communes and provinces (marshals) – in order to maintain registration of waters, water melioration installations and irrigated and drained lands,
- To the Agency of Restructuring and Modernisation of Agriculture – in order to create and maintain the national system of registration of manufacturers, farms and register of applications concerning subsidies for farmers.

Possibilities to maintain the access to data from the register of prices and values of real estates, as well as the cadastre for real estate valuers and agents at the real estate markets, are

ensured by regulations of the Act of August 21, 1997 on Management of real estates. Art. 155 Item 1 of this Act says that, in the course of valuation of real estates, all necessary and available data on real estates, included in: (...) the real estate cadastre, (...) agreements, decisions and other documents, being the basis entry for land register and entry to registers included in the cadastral documentation, as well as in extracts from valuation documentation, transferred to the real estate cadastre, should be utilised.

Art. 181 Item 6 of the above Act says, that – in the course of professional operations, related to a concluded contract for real estate transactions, in the scope covered by such a contract, the agent, who is professionally responsible for implementation of that contract, is authorised to get familiarised and obtain respective copies, extracts and certificates included in: (...), the real estate cadastre (...).

Considering the above restrictions, some of the bodies which maintain the cadastre, have started to implement the internet access to cadastral data. As it turns out from investigations performed by the Author, more than ten units (out of the total of 370) have implemented that process. One of the pioneers is the Warsaw West District. As it turns out from co-operation between the Author and the discussed District, as well as from the Author's activities as the supplier of geodetic services performed within that area, using the assumptions approved by the District – those solutions have been already well advanced. The Warsaw's West District is located within the central part of the Mazovia Province, at the edge of Warsaw, the capital of Poland; its area equals to 53 360 hectares and covers 79 815 cadastral parcels. Implementation of the cadastre via Internet will be described using the example of the discussed district.

3. REAL ESTATE CADASTRAL SYSTEMS EXISTING IN THE WARSAW'S WEST DISTRICT

Geodetic and cartographic resources of the Warsaw's West District is maintained using two, computerised systems, which cooperate, one with another.

GEO-MAP System by GEO-SYSTEM Ltd. from Warsaw is the system used for maintaining the graphical part of the real estate cadastre. This system is used to maintaining the full content of the base map, and the cadastral map is one of its thematic layers. Therefore the system ensures the cohesion of two basic geodetic works, performed at the district level. The ISEG2000 System by BOGART Geosystemy Ltd. from Wrocław is used to maintain the descriptive part of the cadastre.

As it turns out from information passed by Intergraph Polska Ltd. – on November 6, 2007, Intergraph Polska Ltd. took over all liabilities resulting from maintenance contracts, signed by BOGART Geosystemy Ltd. from Wrocław with district and city offices, concerning EGB2000, ISEG2000 and EGB2000-N software packages.

Following respective contracts, Intergraph Polska has the exclusive rights to distribute, develop and provide maintenance for the mentioned systems. The discussed attempts are the result of many years of co-operation between those companies, which started in 2001 and which aims at consolidation of works related to development of lands and buildings

registration systems. In order to ensure continuity of maintenance for existing systems, Intergraph Polska will continue its co-operation with Geosystemy Ltd. Company (source: www.geoforum.pl).

The two mentioned tools used to maintain the graphical and descriptive parts of the cadastre, ensure the mutual access to databases and cohesion of both datasets. Compatibility of the geometric and descriptive database is permanently controlled. It should be stressed once more that the geometric database of the cadastre is only the subset of the base map of the complete content of the base map.

4. INTERNET AVAILABILITY OF CADASTRAL DATA IN THE WARSAW'S WEST DISTRICT

Distribution of data using Internet technology becomes the standard service in many European Union member states, as well as in other countries. This also relates to the cadastral data. Available technology does not create any barriers in this respect and the only barriers are less or more restrictive regulations included in legal acts existing in those countries, which concern protection of personal data.

In the Warsaw's West District – software tools which allows for remote access to cadastral data have been implemented and data have been made available for those entities, which are authorised to have the access to such data, basing on regulations discussed in the previous section. Due to intention to make the cadastral data available via Internet, tools, which allow for remote access to data were implemented, besides the basic systems for maintenance of the real estate cadastre.

Software for Distribution of the Graphical Part of the Cadastre

The remote access to graphical data of the real estate cadastre is ensured by the iGeoMap software package, which is used for publication of data from the base GEO-MAP system on web sites. The base package, i.e. GEO-MAP is not required to use the data; only an Internet browser and, the access to Internet, are required. The only requirement is that the Internet browser supports Java. iGeoMap is automatically loaded from the Internet side at the start. Thus, the external user does not have to be equipped with specialised software packages for maintaining the cadastre and all operations are performed automatically by the Internet browser.

Software elements, which are required to review data, are automatically loaded from Internet when iGeoMap is started.

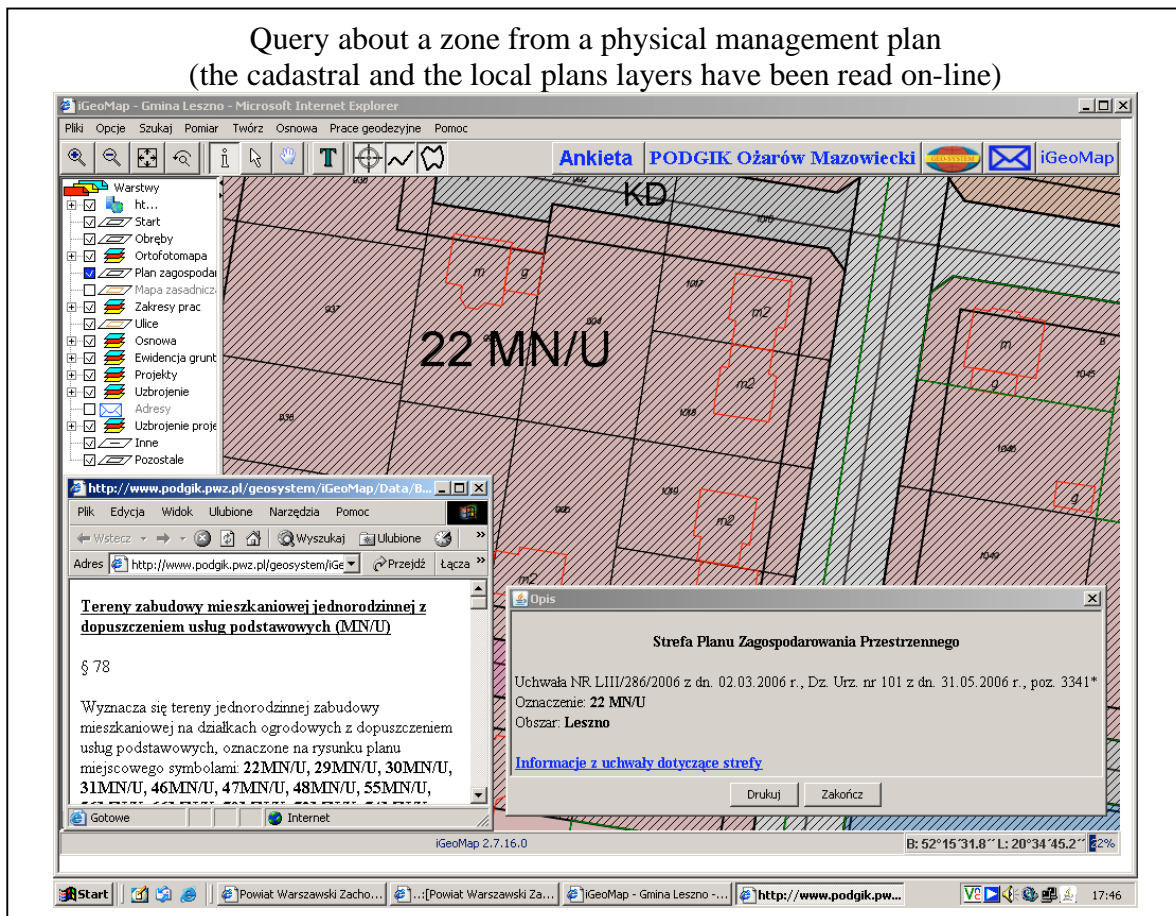
Following the manufacturer's opinion (<http://www.igeomap.pl>) – iGeoMap is dedicated for publication of spatial, vector and raster data, as well as associated descriptive information. This package is a tool for all organisations, which want to distribute the existing data in intra- or Internet. This group of organisations includes the District Geodetic and Cartographic Documentation Centre in the Warsaw's West District.

Following the data passed by the manufacturer, the iGeoMap functionality includes (<http://www.igeomap.pl>):

- The possibility to apply (integrate) data originating from various sources, what allows to publish data on the own server, as an amendment for own data – after conclusion of a special agreement with data owners,
- Publication of data in the system of information layers, with a series of mechanisms of layer modification, delivered to the user who reviews the data (colours, symbols etc.),
- The possibility to publish raster data, which are a very valuable background for vector data (for example a digital orthophotomap),
- The possibility of direct publication of ESRI Shape (SHP) files,
- The access to published data may be password protected; such protection may relate to a layer, to the data accuracy level or to the selected area,
- The possibility to combine published information with multimedia files, recorded in standard formats (*.avi, *.jpg, *.doc, *.xls, *.html and others),
- The possibility to communicate with land registration databases, EGB2000, ISEG2000 and EWID2000, what allows to amend published information with extracts and analysis based on the descriptive part of cadastre,
- The possibility to define an interface to co-operate with other (external) databases, published via Internet
- A series of defined, standard possibilities to search for information and a mechanism used to define own, appropriate method of searching, appropriate for data publishing,
- The possibility to print the data - if allowed by the data publisher,
- The possibility to measure standard geometric features (distances, azimuths etc.),
- Modules of direct access to Oracle and PostgreSQL data.

An example screen of the system, presenting integration of data originating from various sources (the real estate cadastre, physical planning) is presented below.

Query about a zone from a physical management plan
(the cadastral and the local plans layers have been read on-line)



Source: www.podgik.pwz.pl

From the contractor's of geodetic works point of view, one of important functions is the possibility to submit geodetic works via Internet. As it was declared on the District's web pages, works submitted electronically (using the iGeoMap services) are automatically processed, 24 hours a day, 7 days a week, starting from February 1, 2008. The only exceptions are everyday breaks for Internet data publication, performed between 6.30 p.m. and 9.00 p.m. This break is used for data transfer from the production GEO-MAP system to the Internet system of map distribution, iGeoMap. Thus, independently from working hours, the work may be submitted at any time (http://www.podgik.pwz.pl/geosystem/www_start/main.html).

In general, after submission of the work using the iGeoMap services, the current preview of works submitted by the supplier is presented on the website (<http://www.epodgik.pl/>); the access to data from the Geodetic and Cartographic Documentation Centre, related to those works is also performed; both functions are automatically generated. At present, the following products are generated automatically:

- Submission of works document,

- A list of archive materials which may be used for the needs of implementation of given works,
- An appropriate part of the base map, including the cadastral layer,
- A batch file of the system, which contains the numerical form of graphical data from the base map.

With the exception of the batch file, those documents are made available in .pdf files, which may be opened by the contractor by means of *Adobe Acrobat Reader* software, free of charge, and printed directly at the contractor's office.

It is planned to add extracts from the cadastral documentation to automatically issued materials in the near future.

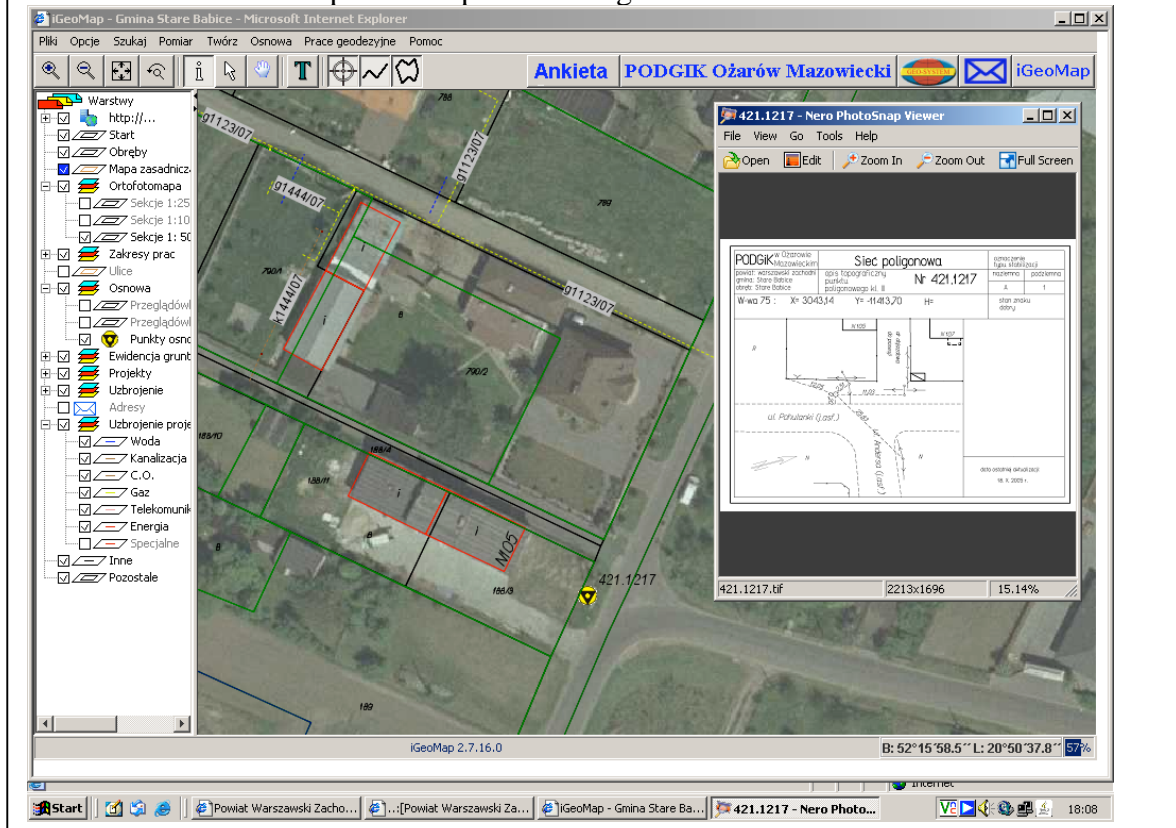
Since June 20, 2007 the District allows the contractors who submit geodetic works via Internet to have the access to the base map (raster + vector). This access is protected by the password which is the same as in the case of submission of works. The cadastral map layer, containing borders of parcels, land use units, outlines of buildings and cadastral designations is available, without the necessity to specify the password for each theme separately. Besides, using the above password one can access topographic descriptions of control points; it will be also possible to access archive materials in the future (subdivision maps, border protocols, lists of co-ordinates etc.) (http://www.podgik.pwz.pl/geosystem/www_start/main.html). The process of scanning those materials has been just commenced by the District.

Thus, the contractor has the access to the following data:

- Submission of geodetic works,
 - A list of archive materials to be used for the needs of implementation of a given work,
 - An appropriate part of the base map including the cadastral layer,
 - A batch file of the system, which contains the digital form of graphical data from the base map – the base map with the cadastral layer,
 - Topographic descriptions of points of the control network,
- and, in the future:
- Extracts from the real estate cadastre,
 - Archive data.

Below an example screen of the system is presented, which shows integration of the cadastral map with an orthophotomap and with the database of points of the control network, including the database of topographic descriptions. Elements of the base map, which are widely accessible (designing of the technical infrastructure) are visible on this screen. Other elements of the base map, including raster data, are available after specification of an additional password.

Locating the geodetic work and retrieving data to perform this work – topographic description of a point of the geodetic control network



Source: www.podgik.pwz.pl

Therefore, after amending the currently accessible layers with two successive groups, the contractor will be able to perform geodetic works with the minimum number of visits to the geodetic and cartographic documentation centre. In theory, the contractor will have to visit this centre twice: first time, to transfer the documentation concerning implementation of a given work to be inspected by an inspector, and then, to collect resulting materials for the contracting unit.

Software for Distribution of the Descriptive Part of the Cadastre

The software tool, allowing for the remote access to descriptive cadastral data has been also implemented at the Warsaw's West District. However, due to existing legal regulations, at present this access is open only for municipal offices located within the District, employees of various organisational units of the District and the Agency for Restructuring and Modernisation of Agriculture. As it was mentioned, those data is to be available for contractors of geodetic works; at present they obtain that data in the form of conventional documents.

The remote access to descriptive cadastral data is performed by the ISEG 2000-INT software package, which is used to publish data from the ISEG 2000 system on www pages. The basic software, i.e. ISEG 2000 is not required when using that data; the standard Internet browser and access to Internet is sufficient. ISEG2000-INT is automatically loaded when the Internet page is started. Therefore the external user does not have to use the specialised software, used to maintain the cadastre and all operations are performed within the Internet browser.

The Internet version of the system used to maintain the descriptive part of the cadastre allows the authorised entities to have the access to the following lists and reports (<http://www.podgik.pwz.pl/>):

- From the “Cadastral database”: the status of required registration units,
- From the “Cadastral database”: the list of owners and possessors of required parcels,
- From the “Database of Real Estate Values”: the list of data concerning transactions related to required parcels.

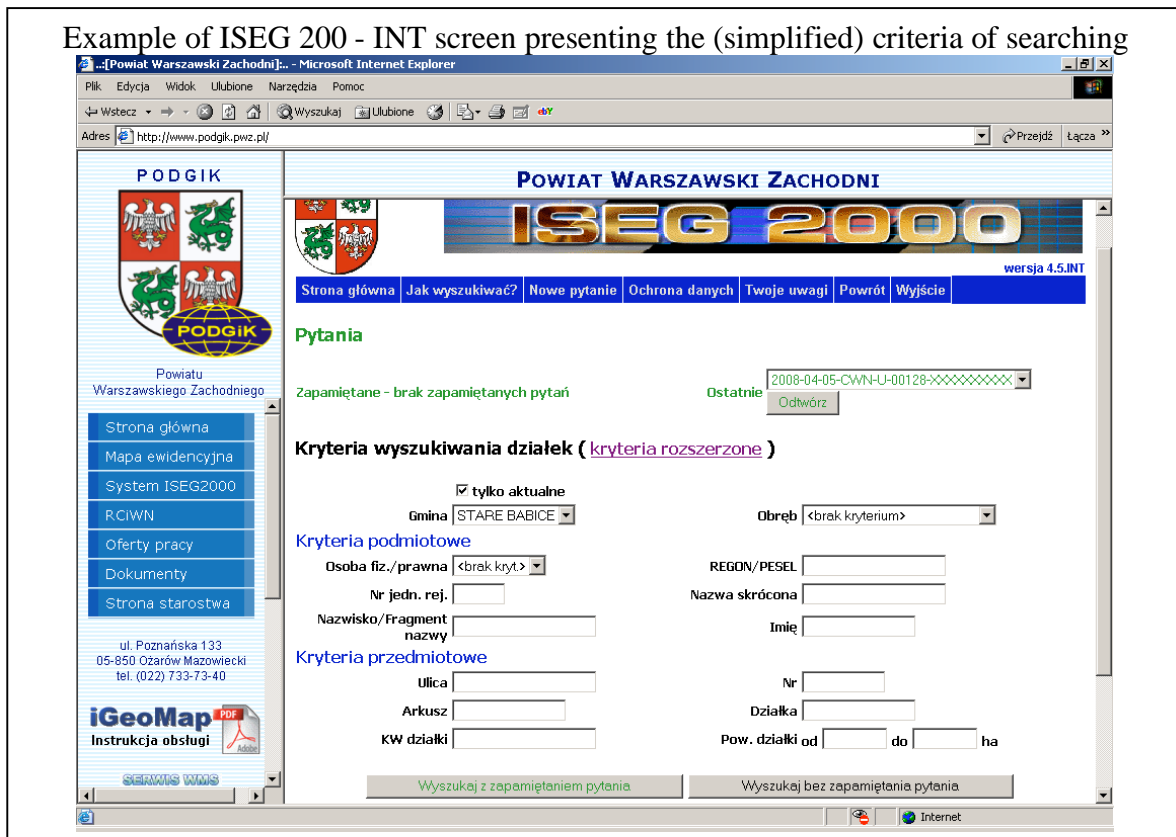
As it is specified in the Internet user’s guide of the system, searching for data is performed in three stages by the system (<http://www.podgik.pwz.pl/>):

- Input of searching criteria,
- Selection of required objects (registration units, parcels or real estates) to be listed in the report,
- Printout or export to a file of the generated report.

As it is specified in the user’s manual (<http://www.podgik.pwz.pl/>): , the user formulates a searching request, specifying searching criteria into appropriate fields of the form. In the case of fields, which are associated with dictionaries (such as communes, bounds, property status, registration groups etc.) the user selects one item from the list. The general searching criteria, as well as subject and object criteria are accessible in the land register. The manufacturer recommends that - if possible – formulating one question the user applies the general criteria and other criteria from one group only (the subject or the object group). Simultaneous utilisation of subject and object criteria results in long waiting for the answer of the system. As it is stressed in the user’s guide, due to the fact that the system registers the history of data searching before the searching is started, every user is obliged to specify the symbol of the work and to describe the related real estate, before the searching is commenced. Those data must be entered to the first two fields of each form; they are marked in red.

As it is specified in the user’s guide (<http://www.podgik.pwz.pl/>), with respect to selection of objects for the report, after finding the answer to the user’s request, the system displays the list of found registration units, parcels or real estates. The user marks objects required for the report on that list. The list containing results of searching is divided into pages. Going through pages does not result in turning on/off the objects for the report. Below the list containing the found objects on every page, the system displays the additional list Marked on other pages for printout, including objects for the report. As it is specified by the user’s guide, with respect to

printout or export of the report to a file, after selection of objects for the report, the users starts the procedure to generate the report, pressing the “Generate Report” button. All marked reports, contained in lists on other pages (marked for printing), as well as marked on the list of searching results on the current page, are used for the report. Export to the .pdf file is possible. Below an example screen of the ISEG 2000-INT package is presented; it shows (simplified) criteria, which can be applied by the user to find registration units, parcels, building, premises, real estates.



Source: www.podgik.pwz.pl

Co-operation of two software tools – the iGeoMap and ISEG2000-INT systems is ensured. In the course of searching objects on the cadastral map the user authorised to review subject data may recall the function, which creates the extract from the cadastral part for this objects, as for example, a registration parcel.

Following the data presented by the software manufacturer (http://www.bogart.wroc.biz/egb2000_informacje.php), the Internet data access module - EGB2000-INT (nearly identical with ISEG2000-INT) has the following features:

1. it allows the authorised organisational units and individuals to have the remote access to land registration data, stored in the EGB2000 System.
2. data are available in the form of reports generated as .pdf files.

3. due to simplicity of work, the Internet version may allow for the access to registration data for individuals without the IT background, within the Local Area Network of the District Office.

4. authorised organisational units and individuals may obtain via EGB2000-INT lists and reports from the registration of lands, buildings, premises, from the database of prices and real estate values.

5. the Internet version of the EGB2000 System is equipped with the following security mechanisms:

- registration of the Internet system users and assigning rights related to particular functions,
- login of users by specification of an open identifier and confidential password,
- specified form of a password – the password must consist of at least 8 characters, it must include small caps and capitals, numerical characters or special symbols,
- requested password changes, within specified periods,
- monitoring of utilisation of the system by registration of time, types of operations and numbers of specified records for the report by each user, and generation of lists concerning the system utilisation,
- encrypting data transmission by means of the SSL protocol.

6. The Internet version of the data reviewing system, EGB2000-INT, may be installed both, in intra- or Internet, distributing data outside to communes and ensuring the access to data for many users, for lower costs, which result from the following:

- The inexperienced user of the computer, must learn how to maintain one software tool only, the Internet browser; thus the costs of training are much lower,
- Besides, the user has the simple, Internet access to selected information in the system; there is no need to learn the complex architecture of the client-server system,
- The Internet application does not require the purchase of software licenses (such as the database management system) for every workstation, which utilises the system,

7. The Internet version of the data reviewing system, EGB2000-INT may be installed in two configurations:

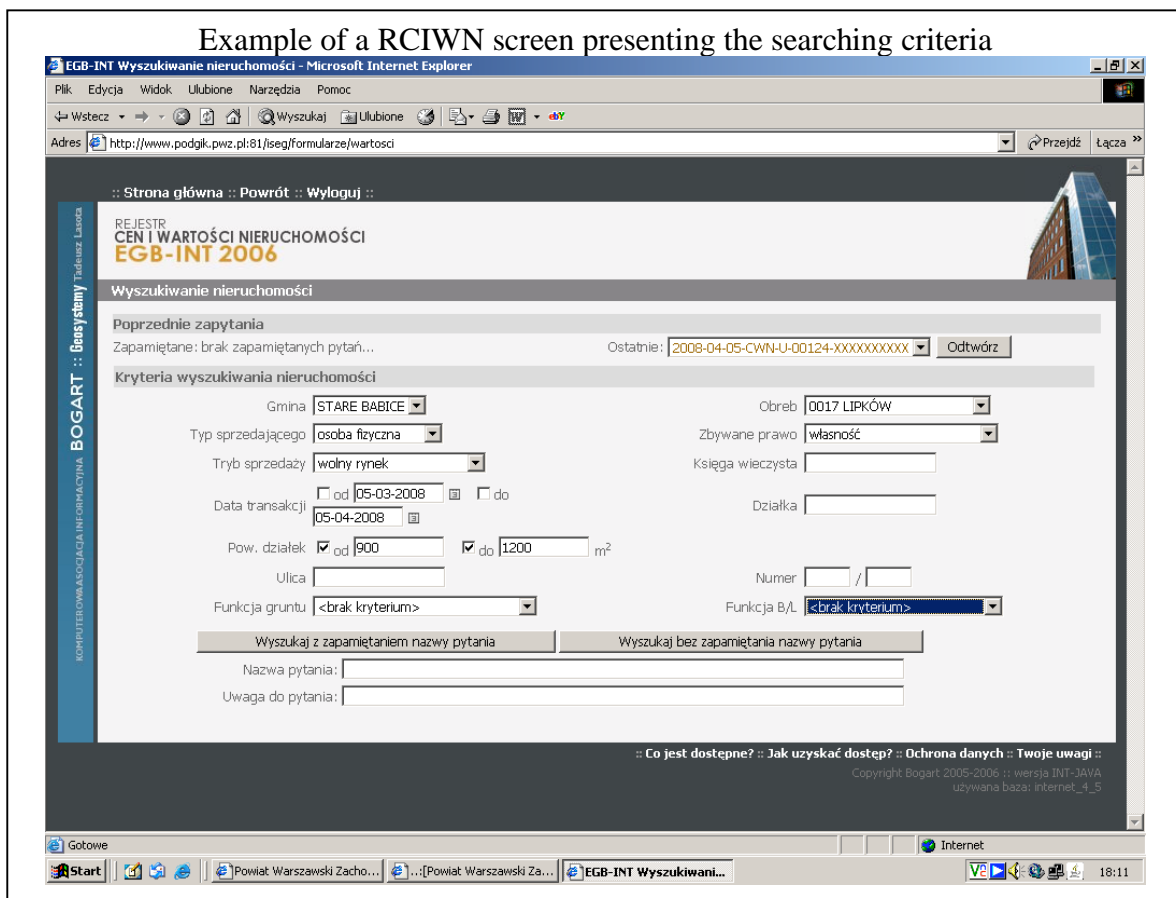
- On the server with Windows 2000/2003 operating system, with the Internet server IIS (Internet Information System), being an integral part of Windows 2000/2003 operating systems,
- On the server with Linux (Red Hat, Fedora, Debian) operating system, with the Internet Apache server.

Software for Distribution of Data from the Register of Real Estate Prices and Values

Tasks concerning registration of prices and values of real estates are performed by the modules of Registration of Prices and Values of Real Estates. The RCIWN EGB-INT 2006 software package is the Internet module, which allows for the remote access to those data. At present, works concerning amendment of the database with data on transactions and real

estate values, are performed; notarial deeds, which transfer the rights to real estates, included in data resources, are being scanned. Until completion of those works the system is inaccessible for users, although it is fully operational. In the future, those data will be available to real estate experts and agents operating on the real estate market. Functions which distribute data from the register of real estates prices and values are also performed by the software package ISEG2000-INT, however the module discussed here is equipped with searching functions of high level of development, it allows to create lists of prices and values basing on found transactions/prices; it also allows for the access to scanned notarial deeds, which are generated in the form of .pdf files by the system.

Below the example screen of RCIWN EGB-INT 2006 is presented which shows criteria useful for searching for transactional prices and real estate values.



Source: www.podgik.pwz.pl

As a result of searching, the system lists successive transactions, which meet the specified criteria; it also lists additional information: the number of transferred parcel and name of the cadastral district, the number of property in land register, the area of the parcel, the data of transaction, and the link to the notarial deed as the .pdf file. This data may be used for generating the report, which presents the following information: the number of the cadastral district, the parcel number, function of the terrain, the area of the parcel, the transactional

price, the price per one sq.m., the date of transaction, the mode of purchase, data concerning the parties of the transaction. The similar procedure of searching and reporting is applied to search for the value.

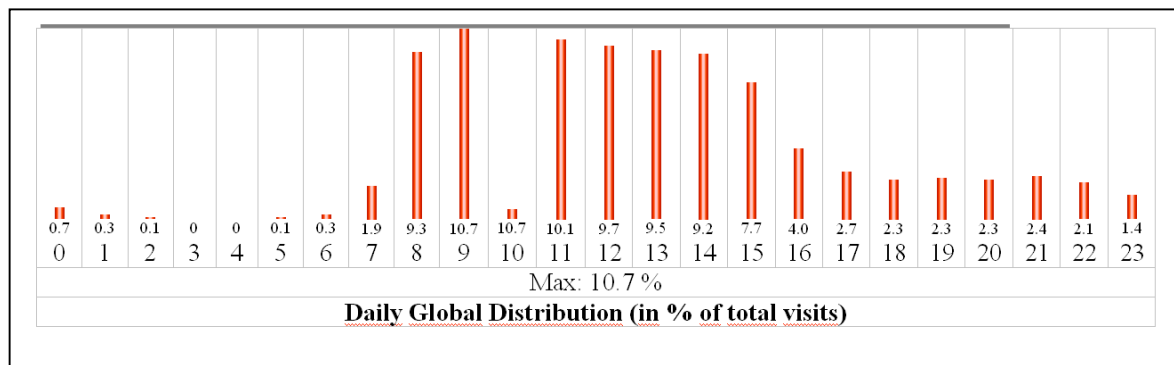
5. STATISTICS OF UTILISATION OF SYSTEM IGEOMAP

It is worth to look at statistical data concerning utilisation of the systems. The Author will present the data concerning the utilisation of the system for distribution of cadastral graphical data, i.e. the iGeoMap system. Data concerning that service are not the subject of the Act on Protection of Personal data, so the majority of them may be available, free of charge. As a result, those statistical data fully reflect users' interests in this information as well as methods of its presentation (via Internet).

Some statistical data concerning utilisation of the iGeoMap services at geodetic and cartographic documentation centre of Warsaw's West District are shown below (Source: GEO-SYSTEM Ltd):

- last 4 years (since introduction of the system in January 2005) – 207 573 visits (total), 5610 visits per month (average),
- this year (january 2008 – 13792 visits, february 2008 – 12343 visits, march 2008 – 11972 visits),
- 9 april 2008 – 541 visits (22 visits per hour),
- 10 april 2008 – 538 visits (22 visits per hour),
- 11 april 2008 – 534 visits (22 visits per hour).

Statistical data concerning utilisation of the iGeoMap services at geodetic and cartographic documentation centre of Warsaw's West District – during a typical working day (in each hour of the day) are shown below (Source: GEO-SYSTEM Ltd,2008):



Source: GEO-SYSTEM Ltd., 2008

The following interests in content of the services have been stated, basing on questionnaires (the number of selections of the important element of the system) (Izdebski, 2007):

- orthophotomaps – 373,
- parcels – 662,
- classification outlines (quality of arable land) – 141,

- land use units – 165,
- designed parcels – 166,
- scope of geodetic works – 105,
- geodetic control networks – 145,
- streets and address data – 275.

Basing on the questionnaire the professional structure of the system users is as follows (Izdebski, 2007):

- surveyors – 224 (27,1%),
- local government officials – 139 (15,4%),
- real estate agents – 141 (15,6%),
- governmental administration officials – 80 (8,9%),
- real estate experts – 70 (8,5%),
- other users, not classified into above groups – 220 (24,4%).

6. CONCLUSIONS

As it turns out from statistical data of one of the systems (iGeoMap), high interests in access to cadastral data via Internet is noticed. The system attractiveness has been increased by additional elements, which amended the set of reference data (the cadastral map), such as, among others, the base map, orthophotomaps, the layer of local plans, or data concerning the points of the geodetic control networks. The probability that successive services, i.e. systems which publish descriptive cadastral data and data on prices and values of real estates would also gain high interest of the users, if legal regulations, which limit the access to personal data, would not be too restrictive.

As it turns out from experiences gained by the Warsaw's West District, the basic obstacle in the process of implementation of the modern tools allowing for the modern access to data (the remote Internet access) is created by restrictive legal regulations concerning protection of personal data. It has been presented, that there are no any technological barriers in creation of such access to data. The software tools (both, iGeoMap and ISEG2000-INT) operate effectively. The only case of insufficient effectiveness of operations occurs when complex questions concerning the very large area are formulated to the database; then the system efficiency is lower than expected. However, the number of such questions is very low and the system operates quickly and efficiently for typical cases of searching. In the case of the system used for graphical data, even after reading in many layers, such as many orthophotomaps and parcels and buildings from several registration districts, any discomfort of work has not been noticed.

The Internet access to cadastral data, as well as to other data stored in resources of geodetic and cartographic data results in advantages for external users – who receive that data without leaving their offices – but, first of all, for a geodetic and cartographic documentation centre. Such a centre is in the same position as if the customer arrived personally at the centre, asking for information; at the same time the official, who would have to serve for the customer, may

perform other works. This results in higher effectiveness of works of the documentation centre, and, in the case of massive access to those data and basing on experiences of other countries – such as the Netherlands – it would be possible to lower the prices for information distributed that way.

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8. <http://www.geoforum.pl>,
9. <http://www.igeomap.pl> (official manufacturer GEO-SYSTEM Ltd website – presenting information about iGeoMap system),
10. <http://www.podgik.pwz.pl> (Warsaw’s West District Geodetic and Cartographic Documentation Centre – official web site).

BIOGRAPHICAL NOTES

Marcin Karabin Ph.D. Born in Warsaw in 1976. Studies of Geodesy and Cartography at the Warsaw University of Technology. Graduated his (M.Sc.) in Geodesy in 2000. Obtained his Ph.D. with a dissertation "Conception of the model of cadastral system in Poland based on chosen solutions in European Union countries" at the Warsaw University of Technology in 2005. Licensed surveyor. Has professional license in the field of: „Land Surveying, implementation and inventory surveys" and "Delimitation and division of real estates (plots) and preparation of documentation for legal purposes". Current position: full-time research worker at the Warsaw University of Technology (Department of Cadastre and Land Management, Faculty of Geodesy and Cartography), providing surveying services as a licensed surveyor (since 2006).

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