The cadastral data exchange standards in Poland[*]

Jarosław BYDŁOSZ, Piotr PARZYCH, Poland

Key words: SWDE, Ground Cadastre, Cadastral Data Exchange Standard, XML, GML.

SUMMARY

Nowadays, there are two almost independent systems registering terrain information in Poland, in two aspects cadastral and legal. They are the Ground Cadastre and the Land Register. The Ground Cadastre captures, keeps and reveals terrain information concerning cadastral objects (parcels, buildings and flats). The Land Register does the same with legal objects (real estates). The main target of Ground Cadastre is revealing real state of cadastral objects, concerning its spatial and technical description. Ground Cadastre data in Poland are basis for spatial planning, taxes and compensations determination, public statistics, real estates management and agricultural holdings registration.

According to Surveying and Mapping Law, the Ground Cadastre in Poland is managed by county local authorities, so it is generally managed independently in every county (*powiat*). It results in fact that, there are 378 different institutions managing cadastral data. The data bases storing and processing cadastral data have usually different structures. Its software also varies.

In a country like Poland, that is trying to develop its economy, there is substantial need for permanent access to cadastral data. Apart from everyday local access to cadastral information, cadastral data are used by central government and its agencies. Cadastral data commercial use is quite probable to take place, too. Because of the variety of different cadastral data bases types and software that manages those, the need for data transfer standard have appeared. Such a standard was created in Poland. It is called SWDE. That is an abbreviation from *Standard Wymiany Danych Ewidencyjnych* that means Cadastral Data Interchange Standard. It was defined in The Order of Ministry of Regional Development and Buildings in 2001 and became a law in Poland. The legal basis and structure of SWDE are presented in this paper. Authors' estimation of its advantages and disadvantages are also described here.

Some efforts have been recently made to introduce solutions made on GML (Geographic Markup Language) for cadastral data transfer in Poland. It is also presented in this paper. Apart from current state of polish cadastral data exchange standards, authors' opinions on future possibilities of its development and application are given here.

TS 2A – Standardization Approaches in Land Administration   1/8
Jarosław Bydłosz and Piotr Parzych
The cadastral data exchange standards in Poland

Strategic Integration of Surveying Services
FIG Working Week 2007
Hong Kong SAR, China, 13-17 May 2007

The cadastral data exchange standards in Poland

Jarosław BYDŁOSZ, Piotr PARZYCH, Poland

1. THE SYSTEMS OF ESTATES' ATTRIBUTES COLLECTION IN POLAND

Nowadays, there are two systems for estates data collecting in Poland. They are the Land Register and the Ground Cadastre. The Polish Land Register captures, keeps and reveals information concerning legal objects. This information generally concerns description and designation, rights, rights established for somebody else's thing and receivables (including mortgage). The Land Register's objects in Poland are mainly real estates.

The Ground Cadastre, first of all consists of data on cadastral objects spatial description, its attributes, values and corresponding official documents. The cadastral objects are parcels, buildings and flats (if they are independent estates). The most common cadastral objects are parcels. For parcels, apart from spatial description, there are data concerning land use type and soil class. For buildings, there are data concerning its functions, technical parameters and references to parcels on which the building is situated. For flats, there are also specifications of rooms belonging, area and references to building in which the flat is situated.

The data that make the Ground Cadastre in Poland are basis for spatial planning, tax calculations, real estate's identification in the Land Register, public statistics, real estates management and European Union subsidies for agricultural and horticultural production.

2. THE AIM OF CADASTRAL DATA INTERCHANGE

Poland has area of 312 683 square kilometers. Poland's population is about 38.5 million. The territory of Poland is divided into 16 voivodeships, 308 counties and 2489 communes. The cadastre is generally managed by local governments in the county level. Sometimes law allows managing cadastre by the commune local government. So, there are 378 independent units managing cadastre data.

There is great need for access to cadastral data for central government and public agencies of different types. Because of great needs, some commercial access to cadastral data may be probably possible in future.

As it is mentioned earlier, the Ground Cadastre in Poland is managed independently in every county, so different types of software are used there. The cadastral databases' structures are also of many types.

Only authorized subjects have access to cadastral information in Poland. Apart from some public agencies they are persons, companies and institutions that either own cadastral objects or have legal interests concerning them. The cadastral information they obtain concerns

TS 2A – Standardization Approaches in Land Administration 2/8
Jarosław Bydłosz and Piotr Parzych
The cadastral data exchange standards in Poland

Strategic Integration of Surveying Services
FIG Working Week 2007
Hong Kong SAR, China, 13-17 May 2007

generally one or only few cadastral objects. The cadastral data transfer standards are not designed for enabling access to such simple cadastral information, but for the cadastral databases transfer.

The authors of this paper think that they are two main reasons for employing cadastral data transfer standards for cadastral data transfer.

The main reason results from will for transferring only some parts of cadastral database, but not the whole one. First, it is not always necessary and sometimes may be prohibited by the law to transfer the entire cadastral database. Employing cadastral data interchange standards enables transferring only chosen data when necessary. For example they may be only geometrical information with personal data excluded. Then, county authorities managing the cadastral database may not be interested in enabling third party access to software solutions or details of database structure. The use of cadastral data interchange standards enables forcing restrictions on transferred data.

The second reason for using cadastral data interchange standards is technological one. Because of the fact that there are no precise instructions for employing definite software in managing cadastre, different systems using different databases are applied there. The most popular databases are Oracle, Microsoft SQL Server or Firebird. So, taking data from base of one type and putting them into base of different type is very complicated. Equipping software managing cadastral database in cadastral data interchange standard export and import solutions makes transfer of these data much easier, but some technical problems may also occur.

3. THE CADASTRAL DATA INTERCHANGE STANDARD (SWDE)

The SWDE (*Standard Wymiany Danych Ewidencyjnych*) that means Cadastral Data Interchange Standard is used for cadastral data transfer according to The Order of Ministry of Regional Development and Buildings – in case of Ground Cadastre and Buildings, from 2001 and The Technical Instruction G-5. According to these regulations SWDE file consist of sections. They are:

– SWDE.w.2.00.(C) GUGiK 2000; (SWDE file first line) ,
– Data context (organisation data),
– Attributes' and relations' declaration section,
– Records' types' definition section,
– Objects' section,
– End of file line.

Every attribute's or relation's name in SWDE standard is preceded by the prefix *G5*. The lines starting from the letter *C* are comment lines. For better understanding of SWDE structure, corresponding examples from SWDE file prepared in one of counties in Silesia region in Poland are presented in the paper. This is the original file produced for academic purposes.

TS 2A – Standardization Approaches in Land Administration   3/8
Jarosław Bydłosz and Piotr Parzych
The cadastral data exchange standards in Poland

Strategic Integration of Surveying Services
FIG Working Week 2007
Hong Kong SAR, China, 13-17 May 2007

The data context section consists of organization type data. This data may be predefined system data (line starts from *NS*) or predefined user data (line starts from *NU*). Information in this section usually contains coordinate system, the name of county managing cadastral data, transferred data destination and other parameters defined by user. The starting line and context data section from example file stand as follows:

> *SWDE.w.2.00.(C) GUGiK 2000;*
> *SN;*
> *C; Przedział czasowy: Wszystkie dane*
> *C; Wersja danych: Aktualna*
> *C; Kontekst danych - dane organizacyjne*
> *NS,DN,2005-12-08*
> *NS,TR,IPE-ZK/2405*
> *NS,TN,Starostwo Powiatowe w Gliwicach*
> *NS,OP,do celów naukowych*
> *NS,ZN,Ewid 2000*
> *NS,ZR,6.10*
> *NS,UX,2000*
> *NS,OS,6*
> *NS,NX,N*
> *NS,NY,E*
> *SXC,2667121279;*

The context section presented above consists of comment lines and predefined system lines. The comment lines contain information that there are all data included and they are current (not past) data. Predefined system lines are the main part of context data section. Some administration and surveying data are included there. The administration data are file's creation data, cadastral unit identification number, data destination, the name and version of computer system managing cadastral data. The surveying data are the coordinate system name, the projection zone number and the coordinates' assignment. The last line of context section is the ending line with check sum.

The attributes' and relations' declaration section consists of attributes' declarations and relations' declarations. Attributes are descriptive values. Relations enable linking different tables' records. Attributes declarations commence with letter *B*. Relations declarations start with letter *W*. Some examples of attributes' declarations are given below:

> *B,G5BPP,NO,; Błąd położenia względem osnowy*
> *B,G5DTA,DN,; Data akceptacji zmiany*
> *B,G5IDB,ZN,; Identyfikator budynku*
> *B,G5LKN,FL,; Liczba kondygnacji nadziemnych*

Value (following *B*) is the attribute name, next value is attribute type (*NO* – numerical, *DN* – data, *ZN* – chart, *FL* –real). Next to semicolon, there is the attribute description and it is ignored by the cadastral computer application. Some examples of relations are given below:

Jarosław Bydłosz and Piotr Parzych
The cadastral data exchange standards in Poland

W,G5RADR;Posiada adres
W,G5RBUD;Jest częścią budynku
W,G5ROBR;Jest położony w obrębie
W,G5RPWŁ;Wskazanie na dokument określający podstawę własności

Value (following *W*) is the relation's name. Next to semicolon, there is the relation's description, ignored by cadastral application.

The records' types' definition section occurs in SWDE file, only if preceded by the attributes' and relations' declaration sections. Types' definitions start with *TD*. Attributes' declarations that occur in type definitions start with *TP*. Multiple relation declaration starts with *WE*. Singular relation declaration starts with *WR*. This section consists of simple types and composite types. The following types may occur in SWDE structure:

- RD – descriptive type - records of such a type did not have spatial references,
- RP – point type,
- RL – linear type – record is the set of polylines – sometimes it is only one polyline, for example parcel boundary,
- RO – area type – record is the set of areas, sometimes a polygon, for example building, parcel or cadastral unit,
- RC – complex type – record is the set of objects being of different types, for example cadastral registrar unit - such records did not have spatial references.

The example of descriptive type record (the address) is given below:

TD,G5ADR,RD; Adres
TP,G5TAR;Typ adresu
TP,G5NAZ;Nazwa wlasna
TP,G5KRJ;Kraj
TP,G5WJD;Województwo
TP,G5PWJ;Powiat - miasto
TP,G5GMN; Gmina - dzielnica gmina
TP,G5ULC;Ulica
TP,G5NRA;Numer domu
TP,G5NRL;Numer lokalu
TP,G5MSC;Miejscowość
TP,G5KOD;Kod pocztowy
TP,G5PCZ;Poczta
TP,G5DTW;Data weryfikacji danych
TP,G5DTU;Data i czas systemowy utworzenia obiektu
X;

The objects' section is the main section of SWDE file. The cadastral objects that are transferred are written there. Their structure is defined in the previous sections. The objects' section may include records with spatial references or ones that do not have them. The spatial records may be of point, linear or area type. The non spatial records are descriptive or

Jarosław Bydłosz and Piotr Parzych
The cadastral data exchange standards in Poland

Strategic Integration of Surveying Services
FIG Working Week 2007
Hong Kong SAR, China, 13-17 May 2007

complex records. Every object of this section begins with identification pointing its type and ends with *X;*. Attributes occurring in the objects' section are preceded with *D*. Relations are preceded by *WG*. The example of area type record for parcel is given below:

    RO,,G5DZE,55478,55478_d_6611,11;
    GL;
    K,+;
    P,G,891657.05,206535.52,;
    P,G,891663.25,206553.49,;
    P,G,891634.57,206563.03,;
    P,G,891631.09,206563.43,;
    P,G,891628.88,206543.99,;
    P,G,891633.07,206543.58,;
    PZ;
    GX;
    C;nr,891641.28,206543.07,1363/181
    D,G5IDD,D,240507_4.0014.AR_1.1363/181
    C;arkusz,1
    D,G5IDR,D,
    D,G5NOS,D,
    D,G5WRT,D,
    D,G5DWR,D,
    D,G5PEW,D,603
    D,G5DZP,D,1
    D,G5RZN,D,
    D,G5DTW,D,2002.11.29-00:00:00
    D,G5DTU,D,1996.03.21-08:13:30
    WG,G5RADR,G5ADR,11197;
    WG,G5RPWŁ,G5DOK,13902kw;
    WG,G5RKRG,G5DOK,11707;
    WG,G5RJDR,G5JDR,13592jrg;
    X;

According to the present polish law SWDE is used for cadastral data transfer. This standard consists of sections, so its structure is not very complicated. It is employed in Poland only, so it is not recognized by software usually used in Land Information Systems or Geographic Information Systems or Ground Cadastre.

The cadastral system is not the subject of special European Union regulations – its managing depends on state authorities, so cadastral systems are different in every EU country. There is no need to transfer cadastral data between different countries at the moment. But the authors think that it would be an advantage if cadastral data could be transferred with standard that is widely recognized.

Not only polish software, but other popular systems are used in polish cadastral system. The software applied in the polish cadastre generally use popular databases like Oracle Database

TS 2A – Standardization Approaches in Land Administration   6/8
Jarosław Bydłosz and Piotr Parzych
The cadastral data exchange standards in Poland

Strategic Integration of Surveying Services
FIG Working Week 2007
Hong Kong SAR, China, 13-17 May 2007

or Microsoft SQL Server. As it was mentioned before SWDE is not the standard commonly accepted by typical cadastral, LIS or GIS software, so adapting cadastral software for handling SWDE is time consuming and expensive.

4. XML AND GML

The standards based on XML have been getting very popular lately. XML (Extensible Markup Language) itself is the computer language used for designing data formats. XML is very flexible, so it may be used for writing any data. With XML we may create and oversee data hierarchical structures.

GML (Geographic Markup Language) is the language based on XML standard for geographic information notation. It is being developed by OpenGIS Consortium (OGC). Nowadays, it is probably the most popular open specification for geographic information presentation. GML includes a number of tools for describing geographical objects, coordinate systems, geometrical attributes, topology and different units used for surveys and generalization.

Presently, there are no legal bases for recording cadastral data using XML or GML in Poland. However, there are some requirements for using GML for data transfer. They result from PHARE 2003 European Union project. According to PHARE project specification, cadastral data written in GML format should be sent to County's Surveying and Cartographic Offices. These data include generally parcels' and land development fields' geometry. The general specification of this PHARE 2003 project includes requirements for transferring SWDE files into GML. According to authors' best knowledge only parcels' and land development fields' geometrical characteristics are being written into GML. This data include only identification, area and parcel geometry and for land development fields also its type.

As we can notice GML is being developed very quickly. We may suppose that some regulations for cadastral objects explicit GML notation will also be established in Poland. It is worth mentioning that GML was created for geographic information notation, where some descriptive attributes may also be appended to geometrical objects. Apart from geometrical information, the cadastral database consists of huge amount of official or legal data and relations between them. So, creating the proper structures for cadastral objects' notation based on GML may be very difficult. It is possible that GML specification will not be sufficient and some standard for cadastral data notation should be based on general rules of XML. It would be probably something different than GML. If it really happens or the development of cadastral data standards in Poland will go another way, we will see in future.

TS 2A – Standardization Approaches in Land Administration   7/8
Jarosław Bydłosz and Piotr Parzych
The cadastral data exchange standards in Poland

Strategic Integration of Surveying Services
FIG Working Week 2007
Hong Kong SAR, China, 13-17 May 2007

REFERENCES

Bydłosz, J. 2005, Problems of data transfer standards concerning ground cadastre and buildings information range, ZN AGH, Geodezja, T. 11, Z. 2, 2005, (published in Polish)

Bydłosz, J. 2006, The present and future of cadastral data exchange standards, ZN AGH. Geodezja, T. 12, Z. 2/1, 2006, (published in Polish)

OpenGIS® Geography Markup Language, Implementation Specification, Version 3.1.0, www.opengeospatial.org, 2004

The Act – Surveying and Mapping Law, from 1989 (published in Polish)

The Main Surveying and Cartographic Bureau, 2005: The vectorization of cadastral maps in Poland. Phare 2003 Project nr 2003/005 – 710.01.08, 2005 (published in Polish)

The Order of Ministry of Regional Development and Buildings – in case of Ground Cadastre and Buildings, from 2001 (published in Polish)

The Technical Instruction G-5, The Ground Cadastre and Buildings, The Main Surveying and Cartographic Bureau, Warsaw 2003 (published in Polish)

CONTACTS

Dr**. Jarosław Bydłosz**
AGH University of Science and Technology
Al. Mickiewicza 30
30-059 Kraków
POLAND
Tel. +48 12 617 22 67
Fax + 48 12 617 45 88
Email:bydlosz@agh.edu.pl

Dr. **Piotr Parzych**
AGH University of Science and Technology
Al. Mickiewicza 30
30-059 Kraków
POLAND
Tel. +48 12 617 22 67
Fax + 48 12 617 45 88
Email: parzych@agh.edu.pl

TS 2A – Standardization Approaches in Land Administration   8/8
Jarosław Bydłosz and Piotr Parzych
The cadastral data exchange standards in Poland

Strategic Integration of Surveying Services
FIG Working Week 2007
Hong Kong SAR, China, 13-17 May 2007