# THE USE OF METADATA FOR COMPLETING THE GENERAL CADASTRE IN ROMANIA

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*Abstract*

*Romania's integration into EU requires respecting the regulations established by the institutions of this community. One of the regulations is DIRECTIVE 2007/2/CE establishing an Infrastructure for Spatial Information in the European Community (INSPIRE). Basing our opinion on the definition of general cadastre, we consider as opportune the use of metadata in completing its objectives, due to the data sets offered by metadata to potential users. Metadata are information describing sets and services of spatial data, permitting the search, the inventory and the usage by field specialists and other interested persons. Starting from the current situation in Romania, the present paper aims to describe the role and the importance of using metadata in the context of completing the general cadastre in Romania.*

*Key words: metadata, cadastre, spatial data, INSPIRE.*

## INTRODUCTION

The modernisation of the Romanian society due to the passing to a democratic economy required a series of projects of ample spread for the design and creation of competitive structures, adapted to the EU requirements. After 1989, a first important step was the revitalization of the right to property, leading to the breaking-up of the land, new pieces that need to be registered in the Romanian general cadastre. Based on this aspect, modern, efficient and economical solutions are necessary so the evidence of landlords and of the Romanian territorial fund to respond to the global contemporary requirements.

Once Romania adhered to EU, the state had to adopt a new legislation, including Directive 2007/2/CE of The European Parliament and Council, from the 14 of March 2007, for the creation of a spatial information infrastructure inside the European community (INSPIRE). INSPIRE as "spatial information infrastructure" means: metadata, spatial data sets and spatial data services, network services and technologies, sharing, access and usage agreements, coordinating and monitoring processes and procedures, established, exploited or available in conformity with the above mentioned directive.

Starting from the definition given by the 2007/2/CE Directive for the creation of a infrastructure for the spatial information in EC, (INSPIRE), that statues that "metadata" means information describing spatial data sets and services and permit their search, inventory and usage", the benefits in the contemporary world of spatial data represent a huge change in creating, storing, using and developing an entire assemble of interconnected data in everything that is linked to the monitoring in all the domains to a global level. INSPIRE is based on an spatial data infrastructure created and under maintenance of each 27 member states of European Union, destined to cover 34 themes of spatial data necessary for the support of the politics of environmental protection, each theme being defined by key components and implementation norms.

The global interest for the metadata standards and practices are consequence of the electronic publishing, the increase of individual or organizational websites and also of the vast non differential data available online. The metadata represents the totality of information used to characterize and describe the data and data sets

in a clear and intelligible way, including information upon the following aspects:

- A good conformity of spatial data sets;
- Applicability conditions for the access and usage of spatial data sets and services;
- The quality and validity of spatial data sets;
- The public authorities responsible with the establishing, administration, maintenance and distribution of spatial data sets and services;
- The limitation of the public access and its reasons.

The metadata classification according to the INSPIRE Directive contains 10 elements according to Figure 1.
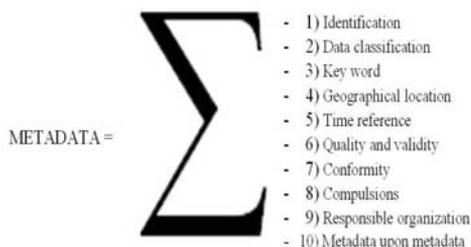


Figure 1. INSPIRE profile for metadata

Determining the spatial data types and the specification of requirements for them is an essential priority of INSPIRE Directive.
Among the main principle of INSPIRE Directive are:

- A single collection and storage of spatial data for the most efficient way of maintenance;
- The possibility of combination without problems of spatial information from various European sources and the sharing between users through a various range of applications
- The collected information to a certain scale must be available for sharing at other scales
- The identification of geographical data must be convenient, also the usage manner for a specific necessity and the acquisition and usage conditions.

The Romanian institution that deals with the creation of the national spatial data infra-structure is ANCPI (The National Agency for

Cadastre and Real Estate Publicity), which is presently working to a spatial data base, its results being the geoportal INSPIRE. The INSPIRE geoportal of ANCPI offers the necessary means for the search of spatial data and data services, under the national legal restriction for access, visualization and download. This way of applying the INSPIRE Directive has the purpose of permitting the access of relevant geographical information, in an actual and qualitative form, supporting the formulation, implementation, monitoring and evaluation of policies and activities with a direct or indirect impact upon the environment.



Figure 2. ANCPI running projects



Figure 3. INSPIRE geoportal to ANCPI

## STANDARDS OF THE INSPIRE DIRECTIVE

Implementing the national spatial data infra-structure respects the technical specifications emitted by The European Commission, under the name of INSPIRE profiles, based on national and international standards (ISO 19115, Dublin Core, Open Geospatial Consortium, Comité Européen de Norma-lisation, CDS etc.). Following CEN (Comité Européen de Normalisation) were adopted the following OGC (Open Geospatial Consortium)

standards: ISO19115/ ISO19119 Application profile for CSW (Catalog Service) 2.0 (CAT2 AP ISO19115/19)2, enhanced with a number of supplementary fields explicitly required in the initial INSPIRE proposal) usage rights, compliancy etc.), Figure 3.
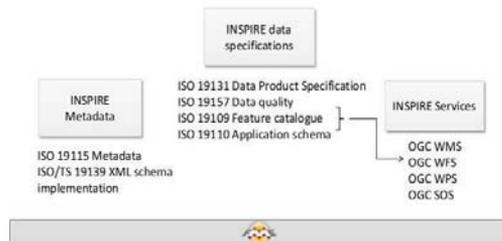


Figure 4. International standards for metadata creation

For the creation and update of metadata it is necessary to quantify the necessary resources, to adapt the existing metadata and to create metadata for the data sets that will be created. An ample example is the EuroMapFinder4 catalogue for services, launched on the 25th of January 2006, a catalogue based on ISO 19115. This catalogue includes descriptions for the data provided by 18 members of EuroGeographics.

The access to the catalogue is based on the discovery service, Figure 5.
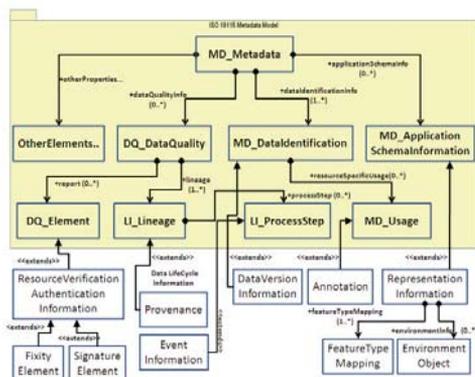


Figure 5. Metadata model according
to the European standard ISO 19115.

Among the main aims of the INSPIRE directive is that of determining the specific data types required by European SDI.

INSPIRE Data Specification Drafting Team works with ISO 19131; ISO includes descript-tions of the function schemes, catalogues of elements, spatial and temporal reference systems and the quality of the information. Figure 6.
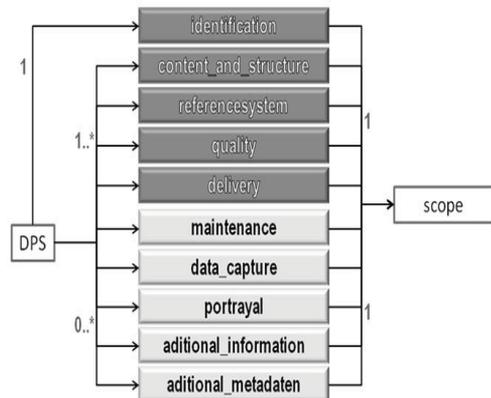


Figure 6. Data content for ISO 19131 standard.
UML simple model for DPS.

It is well-known that all the information content group are linked to a domain that describes the geographical area of availability, thus, beside the identification content group, each group may present more than an entry, so the data from various geographical regions may have different entrances in DPS.

In case the information is stocked according to ISO 19131, DPS may be used in the spatial time of the data production process to support the working flow and to automatically generate metadata for the produced data.

Thus, there are three possibilities of applying DPS:

- The direct mapping of the DPS content for the metadata of the produced data;

- guiding and supporting the user and the working flow during the production process;

- The support of manual introduction of metadata.

## SDI TECHNOLOGIC CONCEPT

Spatial Data Infrastructures – SDI represent the technology, the politics, the standards and the human resources necessary for the acquisition, distribution and the usage of spatial data.

This technology has the as main objective the maximum usage of geographical information in the possession of various operators from the private and public domain.

Spatial Data Infrastructures are continuously developing on national and international levels.

Among the states that exclusively contributed to the implementation of the spatial data infrastructure are: **The United States of America** that founded The Federal Geographic Data Committee (FGDC) in 1990, **Canada**, implementing GeoConenections, an important component of CGDI (Canadian Geospatial Data Infrastructure), **Australia** and **New Zeeland**, implementing The Australian Spatial Data Infrastructure.



Figure 7. Providers for the Canadian spatial data infrastructure.

In our country, three types of metadata were developed:

a) ".xls" format metadata –colour orto foto plan, scale 1:5000



Figure 8. ".xls" metadata model – colour ortofotoplan scale 1:5000.

b) ".xml" format metadata – colour ortofotoplan, scale 1:5000.



Figure 9. ".xml" format metadata –colour ortofotoplan, scale 1:5000.

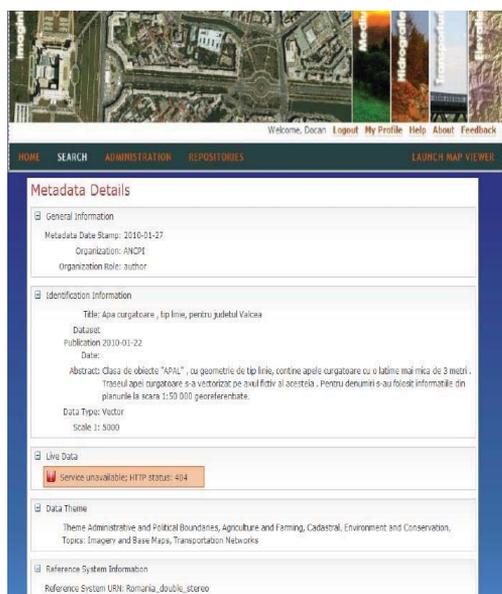c) ".xml" format metadata – on the A.N.C.P.I. Geoportal– TOPRO5

Figure 10. ".xml" format metadata –
on the A.N.C.P.I. Geoportal– TOPRO5

It results that the aim of creating a national spatial data infrastructure is to create a network of valid spatial data resources, which will constitute an important support in taking any type of decisions.

**CONCLUSIONS**

Due to the fact that the spatial data structures are becoming more and more elaborate and new sets of data are created, the provision and the control of spatial data quality has an important role in the scientific development.

The continuous evolution and the dynamics of spatial data structures and sources have direct consequences upon the entire mechanism of creating geographical informational systems and the general cadastre works.

The spatial data infrastructure is meant to act like a deposit for data and spatial data services, helping the exchange of spatial data between the participants of its creation.

The real value of spatial data is visible only when solving global and local problems.

The benefices offered by the usage of spatial data include:

- The enhancement of the informational quality necessary to the territorial development and to the cooperation with the local authorities (rural and urban);

- Increasing the interoperability in the information system necessary for the projects developed by the central and local authorities;

- Reducing the associated costs for the creation of spatial data;

- Increasing the degree of awareness for the local and global environmental problems.

Creating the spatial data infrastructure has a major role in ensuring the availability of spatial data. For an efficient implementation process of the Government Edict 4/2010 and the development of the national spatial data infrastructure, it is necessary to translate into action a number of measures, the following being considered as priority:

- Publishing reference data sets in order to permit the harmonization on spatial criteria of the existing data and new data;

- signing agreements between institutions for the Exchange and common usage of data in order to develop INIS;

- Adopting at the beginning of each year the plan of activity for the INIS Council and the attribution of the participant organisations, so they may plan the necessary resources;

- Organising events on the theme of spatial data infrastructure, where may be discussed a series of technical aspects related to the development of INIS.

The time, the effort and the resources consumed for collecting similar spatial information may be used to collect new information that will be the starting point for future spatial data sets.

Applying the INSPIRE Directive will contribute to the enhancement of the national spatial data infrastructure, especially in the domain of inter operability of spatial data and services and will represent a common effort of cooperation upon the technical implementation of the directive.

Starting from the definition "the general cadastre is a unitary and compulsory system of technical, economic and juridical evidence of all the real estate on the territory of the state" and based on our study, we consider as necessary a much more consistent approach of metadata in the creation of the general cadastre on the territory of our country.

## PROPOSALS

Analysing the above presented aspects and based on the large usage of spatial data infrastructure, we consider useful, practical and economical the usage of spatial data sets for the elaboration of the national cadastre and cadastral register creation.

We propose for this purpose a spatial data model we consider useful for the creation of the national general cadastre programme.

Thus, we propose that all the three functions of the general cadastre to be implemented in spatial data sets:

- The real estate identified with I.E. 50000, registered in C.F. Bocsa, is in the property of Voina Ioan with the cote 1/1, the area of 2877 square meters, the category of arable usage, situated in the unincorporated area of Pohanca, Caras-Severin County.
- The owner obtained the right through a bill of sale, authenticated under the number 1/2015 on the 10th of January 2015 by the attorney Ionescu Marius.
- The real estate is identified from a plan metric point of view through the rectangular coordinates (X and Y), Figure 11.
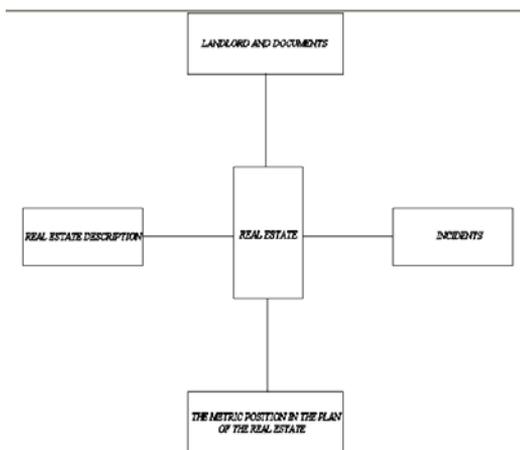


Figure 11. Model for metadata structure, with applicability in the national program for the general cadaster.

## REFERENCES

Badea A.C., Badea G. 2005. Structura standardizata a metadatelor spatiale digitale, Revista RevCad, Alba-Iulia,141-150.

Docan D.C., 2009. Contributii la imbunatatirea calitatii datelor spatiale in GIS, Teza de doctorat, U.T.C.B., , Bucuresti.

Directiva 2007/2/CE a Parlamentului European si a Consiliului din 14 martie 2007 de instituire a unei infrastructuri pentru informații spațiale în Comunitatea Europeană (Inspire).

Matthew J.P., 2000. Cadastral standards required for the national spatial data infrastructure, San Jose State University.

Westcott, B.- Opening the World's Data with ISO/OGC Metadata Standards, http://www .ingr.com/gis/community;

http://ancpi.ro/pages/wiki.php?lang=ro&pnu=hartiSiPlanuri, Catalog produse Fondul Național Geodezic (FNG);

www.fgdc.gov