



Report of Joint Conference PCC with EuroGeographics-CLRKEN
LET'S TALK ABOUT (LEGAL) RELIABILITY OF THE
CADASTRE

Vienna, 20-21 November 2018

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Edited by

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Introduction

With the wider availability of cadastral data and information, the cadastre is increasingly used not only for the purpose of property transactions or taxation, but increasingly in the sense of a "multi-purpose cadastre" as part of a national Spatial Data Infrastructure (SDI) and as a cornerstone for eGovernment.

Today, cadastral data in most European countries is predominantly available in digital form. As soon as the data and information is available and easily accessible – e.g. via web portals – clients use cadastral information for many different purposes. Therefore a cadastral system needs to provide the location of a parcel as well as the extent of rights, restrictions and responsibilities related to land and real property.

As the cadastre is used in combination with other data or as a layer in a SDI, the quality of the data increasingly becomes an issue. Spatial information is collected and managed at different levels of precision. Inaccurate data affect the quality of decision-making at the parcel level. Improved quality of spatial information will lead to increased consumer confidence and trust.

The availability of cadastral information in an appropriate quality is a requirement for supporting decision making in land use and land development, increases the trust of the users in the cadastre and strengthens the (legal) reliability of the cadastral data.

In 1968, a legal cadastre (the so called "Grenzkataster") was implemented in Austria with the objective to extend the purpose of the cadastre from taxation to legal validity of the property boundaries. Now 50 year later, we can evaluate the process of implementing the legal cadastre. The joint PCC/CLRKEN-Conference in Vienna on 20-21 November 2018 did provide an overview of the situation in several European countries, how the cadastre is used, what quality aspects are set, what challenges are foreseen and what measures are taken to bring the cadastre in an appropriate quality to fulfil its role.

Opening – Austria

The Legal Boundary Cadastre in Austria: 1968-2018, The 50th Anniversary

Julius Ernst (Federal Office for Metrology and Surveying (BEV), Austria)

The Austrian Real Estate Cadastre is the result of a continuous innovation since the "Grundsteuerpatent" of 1817, which initiated the systematic assessment and surveying of all objects (parcels). For the first time the territory of the Austrian-Hungarian monarchy was mapped in its entirety. In the beginning, the primary objective of this Real Estate Cadastre was taxation. Nevertheless and since the very beginning, the cadastral system has been providing complete evidence of all parcels throughout the Empire with the potential for multi-purpose use.

In 1871 the enactment of the "General Land Register Act" and the "Implementation Act for the Land Register" initiated the co-operation between the Cadastre and the Land Book. Since that time the coherence between both these essential components for land administration has been established and has additionally been ensured by the "Evidenzhaltungsgesetz" focusing on the continuous maintenance of these registers.

In 1969 a new legal basis was implemented. With the Surveying Act the transition from the Fiscal Cadastre to the Legal Boundary Cadastre was initiated. The main purpose of the introduction of the Legal Boundary Cadastre was to create secure boundaries of the parcels, i.e. the boundaries would be clearly defined and accurate. Also disputes over boundaries would be avoided when the boundaries become legally binding. If a dispute over a boundary arises between two parcels registered in the Fiscal Cadastre, the property owners must bring the question to court to resolve the dispute and to have the boundary legally set by a judge. If the parcels are already registered in Legal Boundary Cadastre, it is not possible to bring a dispute to court. In this case, the cadastral office is responsible to solve the dispute based on the original surveying documents.

Another intention of the introduction of the Legal Boundary Cadastre was to establish a higher quality in the Cadastre. In most cases, newly formed parcels must get coordinate based boundaries and be recorded in the Legal Boundary Cadastre.

To make a system of legally binding coordinates be applicable in practice, a higher quality of the coordinates is necessary. In Austria, the Surveying Act requires that surveying is based on a sufficient number of fixed reference points for parcels to be transferred from Fiscal Cadastre to Legal Boundary Cadastre. In this way, the coordinates, and thus the boundary of the parcel gets a sufficient high accuracy and quality to be registered in Boundary Cadastre.

The establishment of the Legal Boundary Cadastre is not only a task of the cadastral authority. According to the principle of public-private partnership, private licensed surveyors and other authorized persons in accordance with the Real Estate Division Act are involved in the process. Private licensed surveyors mainly perform surveying for the transfer of parcels.



Figure 1: Parcel in Legal Boundary Cadastre.

In 1969, at the time of the introduction of the Surveying Act, it was hoped for that most landowners would like to have their land legally secured in the Legal Boundary Cadastre. Now, 50 years later, only 17% of all parcels are at the highest quality level and part of the Legal Boundary Cadastre.

Cadastral information is not only used for property transactions but in a multipurpose sense. It is an important part of the infrastructure of a state and the public administration and is a basic layer in the Information Systems of public authorities, on municipality, provincial and state levels. It documents the legal situation (e.g. public rights and restrictions) and in this perspective it is irreplaceable.

Since cadastral information is available online, the number of users and access is increasing. Not only professional users (e.g. surveyors), but also other institutions base their activities on the Cadastre:

- Parcel based subsidies;
- Spatial land-use planning;
- Property taxation;
- Public administration;
- Austrian Address Register.



Figure 2: Milestones of the Austrian Land Administration System since 1968.

Since 2012 all applications of the surveyors have been submitted in digital form and the electronic legal transactions with the land register have been established, which led to an enormous acceleration of the process.

In addition to the technical improvements, there were also permanent adjustments in the legal issues in order to ensure the legal security of the Legal Boundary Cadastre in the long term. In order to improve the management process, also the so called "Structured Surveying Plan" has been implemented, a big step towards a fully digital surveying plan.

Since 2015 all surveying documents of the surveying offices are classified and digitized and made available to the surveyors directly in the web portal. In 2024 only digital documents will be available.

Session 1 – Finland, Germany, Belgium, Italy

The Finnish Cadastre: Fully Digital with Full Coverage, and an Interoperable Part of the Base Register System - but is that enough?

Pekka Halme (National Land Survey, Finland)

The Cadastre in Finland has its roots in the Swedish system. In 1809 when Finland became part of the Russian Empire an own Finnish authority was founded in 1812. The legislation and principles however remained on the former basis.

Later in the 1900's the National Land Survey and the 75 biggest municipalities updated their own manual Cadastres, 86 in total. The national Land Information System (LIS) was a copy of those primary registers. Land registration was carried out by the local courts.

Today's Cadastre is based on legislation dating back to 1995. The legislation unified the procedures and rules for both urban and rural areas, which again created a better foundation for digital work processes and data processing. A new production system, Jako, was rolled out in 1998.

Based on new legislation, an official nation-wide single cadastre was introduced as part of the LIS in 2005. The NLS maintains the system, which is updated by both NLS and the 75 municipalities. The system is fully digital with nation-wide coverage. In 2010, also the Land Register activities were taken over by NLS.

The legacy we have to live with is the complexity of the cadastral data and its time layers. Consequently, this means varying specifications and data content. To improve the situation the NLS has carried out several government funded data quality improvement projects over the last decades.

The issues we face today are fairly typical for this time. We need to understand and find out what data are relevant for today's users and, actually, what type of a cadastre we need in the first place.

The ongoing change towards the digital society overall affects also customer needs and demand, which force most of our public organizations towards service orientation. The use of (register) data increases and diversifies. For example, modern positioning needs open data, and along with it the accuracy of e.g. boundary data becomes an issue.

We need to improve our internal efficiency by introducing automated production processes and over time also automated decision making. The first successful roll-outs have been done in Land Registry concerning mortgages.

A lot boils down to new operating and business models. Platform economy, ecosystems and networks are seen as a way to provide customers with better service. When the registers and databases are

interlinked and interoperable you can start building one-stop-shopping opportunities. From an agency perspective this has to be paired with appropriate steering and funding mechanisms.

The "Katasteri2035" project, a research study at Aalto University, funded by NLS and the Ministry of Agriculture and Forestry, aims to provide research-based views and scenarios for formal decision-making. The decision to take is a grand one, to start designing the future Finnish Cadastre.

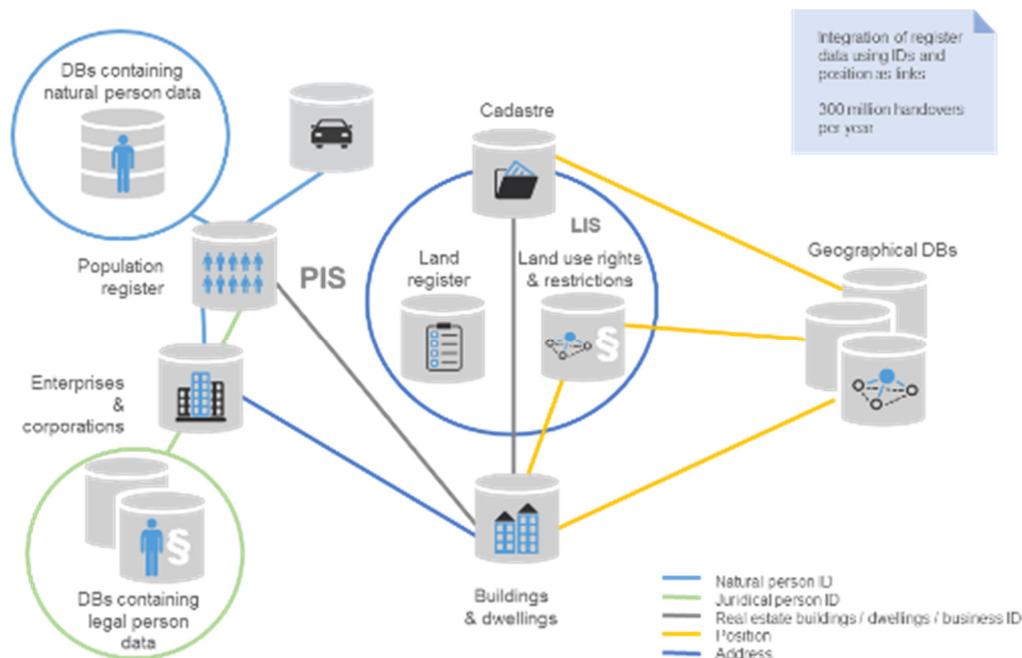


Figure 3: Base register system in Finland.

Reliability Aspects of the German Cadastre

Björn Degel (Working Committee of the Surveying Authorities of the Laender of the Federal Republic of Germany, AdV)

In contrast to land registration, the German cadastre lies in the competences of the German Laender. In order to keep uniformity throughout Germany, the AdV recommends standards on cadastre, state survey and topographic mapping.

History of the German cadastre

Although the first cadastre has been established in 1667 in Hessen-Darmstadt, most of the cadastral systems in Germany were established in consequence of the French Revolution to reach a more fair taxation of real properties. On 1 Jan. 1900, the German civil code (Bürgerliches Gesetzbuch, BGB) came into effect. Along with the BGB also the land registry law (Grundbuchordnung, GBO) became final. The former tax-cadastre changed into a property-cadastre as the cadastral map is legally considered a part

of the land register. From 1934 until 1949 the so called "Reichskataster" was no longer in the competences of the federal states. The first German-wide cadastre standards had been set in that period. Amongst others, the appraisal of soil became part of the cadastre.

By the end of World War II, Germany was divided. While the western part became the Federal Republic of Germany (FRG), the eastern part became the German Democratic Republic (GDR). According to the Grundgesetz (German constitution) the Western-German cadastre became Laender-law again. The "Einheitskataster" in Eastern-Germany was merged with the land register. At the same time, land and building ownership was separated. As a result of the German reunification on 3 Oct. 1990, the Western-German cadastre served as a role model for the five new Laender. Cadastre and land register became separated again. The separated land and building ownership was merged again.

Contents of the German cadastre

Property-cadastre contents are the cadastral book as a copy of the owner information of land registry, the cadastral map and the set of numbers (Zahlenwerk), which consists of the documentation of the measurements and the point register with precise coordinates.

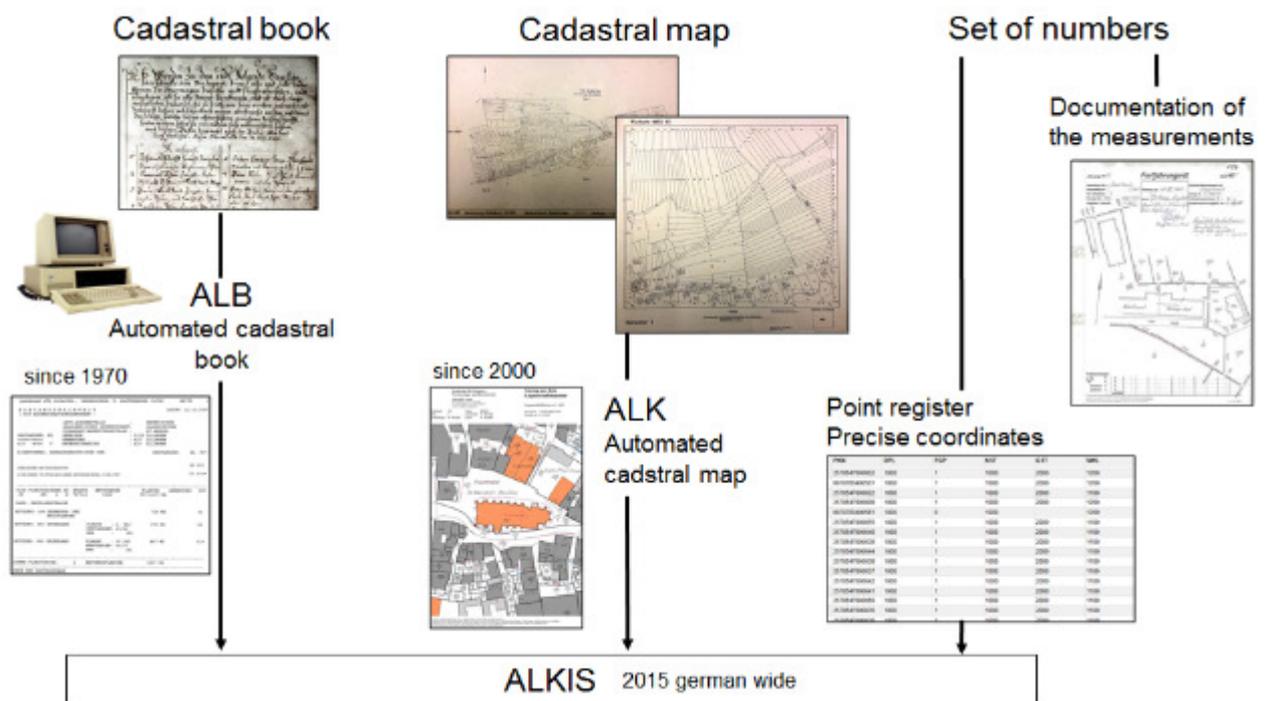


Figure 4: Content of German Property Cadastre.

A constant data exchange between cadastre and land register is retained both by means of analogue and digital data exchange. Up to now, the land registry database is not more than an auxiliary file. Legally binding however, is the written entry in the land registry. In 2022 we are expecting the Datenbankgrundbuch (DaBaG) to launch. It consists of legally binding database-entries. At the end of 2015, ALKIS has been established as a new cadastre standard throughout Germany (see also Figure 4 above).

The core data sets of ALKIS are the cadastral parcels, buildings, owner information, public-law restrictions, appraisal of soil, and actual use as a mix of land coverage and land use. As geospatial reference data ALKIS serves as a multi-purpose-cadastral and is a backbone of the geospatial data infrastructure.

Legal reliability

The German Civil Code (BGB) provides the land registry with public faith. If a landownership right is registered in the land registry, the owner is presumed to be entitled to the right. If a registered right is deleted from the land register, it is presumed that the right does not exist (§891 BGB). Consequently the land register and thus the cadastre are considered to be correct until the opposite is proven. The bona fide acquirer is under special protection.

In order to acquire right to land, a notarised contract, a notarized conveyance and entry in the land register are mandatory. There are only few legally permitted exceptions from this rule:

- Acquisitive prescription after 30 years according to §§ 900 or 927 BGB is proved in a complex procedure before the civil court;
- Legally regulated land readjustment according to Baugesetzbuch or Flurbereinigungsgesetz;
- Expropriation according to Baugesetzbuch;
- Compulsory auction before the civil court.

Combined with the public faith of the land register, these strict rules lead to a very high level of legal certainty. For this reason, the cadastre with the land register is amongst others a highly reliable basis for property valuation.

Technical reliability

A legally secure boundary determination requires a reliable cadastre. Some Laender defined a coordinate cadastre with highly precise coordinates of the boundary line. These coordinates are legally binding. Coordinates are not legally binding in the coordinated cadastre or "classical" cadastre. The border has to be determined according to the neighbourhood principle using the documentation of the measurements. Cadastre is legally binding in case of so called "impeccable measurements". This means survey and border points have been clearly determined and thoroughly checked, the parcel boundaries have been legally established and the surveys have been transferred to the real estate cadastre. From beginning of the 20th century property surveying in general may be considered as impeccable. In case of ambiguity and border confusion without agreement of the parties involved, a decision of the civil court on the border line is necessary.

The analogue cadastral maps have been digitized. The accuracy of the digitized map in general lies between 30cm and 1m. It is the aim of the cadastral agencies to improve the geometric accuracy through homogenization. The map is moved to the coordinates from point register maintaining the geometric relations.

Conclusion

The German cadastre is a precise and highly reliable part of the property protection system. It is a reliable pillar of a functioning economy, a reliable backbone of the geospatial data infrastructure and a reliable basis for property valuation.

Belgian Cadastre: Peculiarities and Future Challenges

Jolien Neckebroeck and Cédric Jacmain (Federal Public Service Finance, Belgium)

The *Measurements and Assessments administration* or Belgian Cadastre operates within the Belgian Federal Public Service Finance as an authority specialized in developing a national geographic information system as well as assessing the value of real estate on the Belgian territory. Being part of the larger *Administration of Patrimonial Documentation*, the Belgian Cadastre has in the past years been subject to changing procedures and legislation, as successive state reforms have led to a large power shift towards the regions. As a result, some cadastral and patrimonial matters are taken over by the regional authorities, while others are still regulated at national level. The competence for the Property Tax, which applies to all categories of property in Belgium, as well as the collection of estate and mortgage duties, have fully been taken over by the Flemish region for properties in Flanders, while real estate situated in Wallonia or Brussels is, for those matters, still managed at federal level. When it

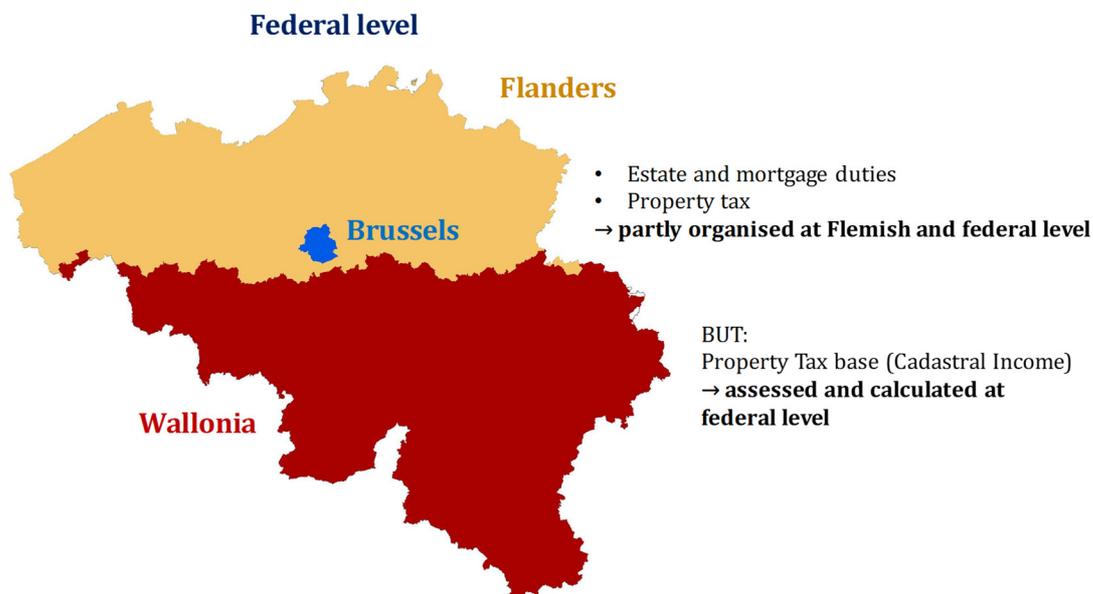


Figure 5: Belgian cadastre – power shift towards the regions with every state reform.

comes to the cadastral plan, the Flemish region has taken over the competence of making any adjustments to buildings on that plan, whereas the Cadastre is still responsible for changes in parcels. The

complicated state structure and need for simplification, as well as the outdated character of the tax base on real estate, known as *Cadastral Income*, have urged the Measurements and Assessments administration to explore new ways of valuing properties. In collaboration with the academic world and the regions, they are doing research on computerised valuation methods based on econometric valuation models, which can provide values that better reflect the reality on the property market and thus move towards a more transparent and fair cadastral system. The Belgian Cadastre has made some important achievements in recent years when it comes to automating the cadastral processes and improving the correctness of its documentation. In 2015 for example, the principle of *Precadastration* was introduced, which holds the obligation to clearly define every new parcel before drawing up the Officers' deed and thus excluding any contestation of the identification of a property and its rights of ownership. They are keen to continue this effort and move towards a fully digital and self-regulated system in the coming ten to twenty years.

Reliability of the Italian Cadastral System – Data Quality and Improvements Prospects

Franco Maggio and Arturo Angelini (Central Directorate for Cadastral, Cartographic and Land Registration Services, Agenzia delle Entrate, Italy)

The management of the Italian cadastral system is currently entrusted to the "Agenzia delle Entrate" (the Italian Revenue Agency), a non-economic public body that, as well as being responsible for collecting tax revenues, providing services and assistance to taxpayers and carrying out assessment and inspections aimed at countering tax evasion, also provides cadastral, cartographical and land registration services through the Central Directorate for Cadastral, Cartographic and Land Registration Services that plays also the role of State Mapping Body.

Although the Italian Cadastre has no legal value, it is highly reliable from the technical and administrative points of view and constitutes an essential part of the geospatial data infrastructure.

The progressive awareness of the importance of the cadastral information, including technical, economic and juridical data, to assure more efficiency and effectiveness to the land management activities, has led to a rapid evolution of the Italian cadastral system.

In order to accomplish these functions in an effectively way, the Italian cadastral system today is fully digitalized, constantly updated through the on-line submission of the updating documents drawn up the private chartered surveyors through software applications unique for the whole national territory, accessible also via web through services dedicated to the different kind of users (citizens, professionals, companies and Public Institutions).

Completeness, correctness and updating of cadastral information are, therefore, essential aspects of a reliable cadastral system.

It is quite clear that these characteristics are often connected to the regulatory framework that governs the establishment and maintenance of the cadastral system, to the necessary resources to achieve this objective, as well as to the technological developments progressively available.

Even though the Italian Cadastre is characterized by a high level of reliability, *Agenzia delle Entrate* constantly works to improve the overall quality of the system and to recover residual inconsistencies of databases mostly derived from historic reasons, connected to the previous distinct management of the Land Cadastre from the Urban Building Cadastre (two systems established with different rules and at different times), that caused, from the very beginning, a significant mismatch between the information registered in the administrative cadastral archives and those contained in the cartographic archive.

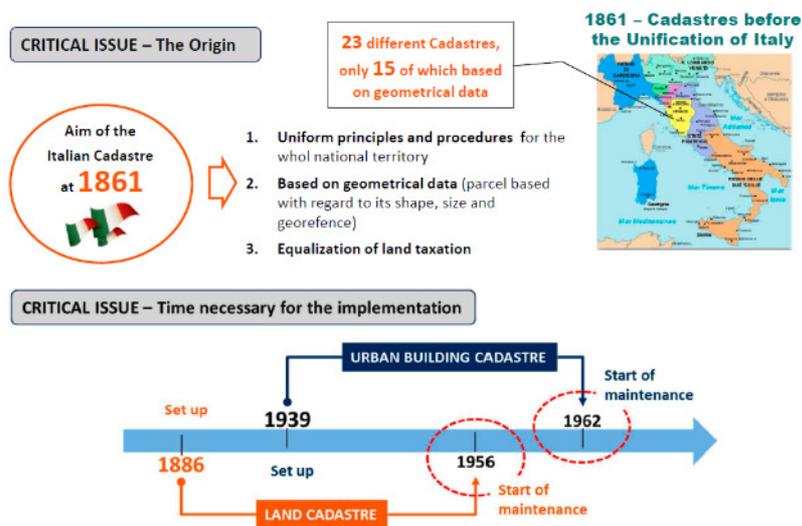


Figure 6: The origin and the time necessary for the implementation of the Italian Cadastre.

It is also important to underline that whereas it was the State that established the Italian Cadastre, its updating is essentially delegated to the real estate or land owners, through private chartered surveyors qualified to draft cadastral updating documents. Although this model allows the overall sustainability of the updating system, it requires on the other hand the implementation of control actions against evasive and elusive phenomena that could impact on the completeness of the cadastral information system.

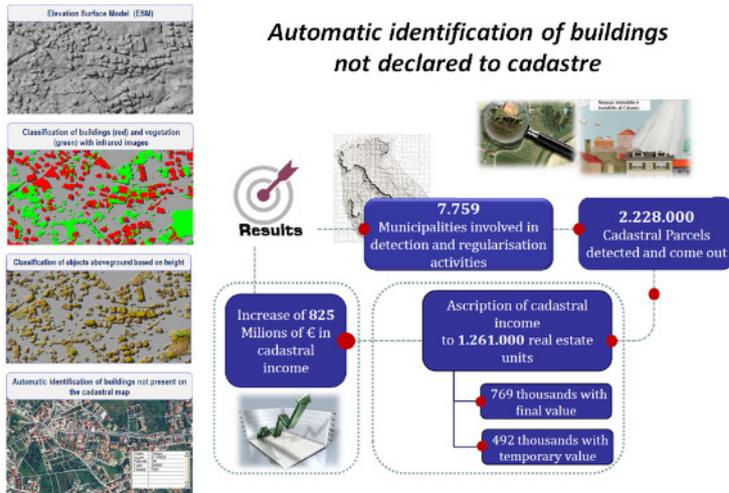


Figure 7: Identification and registration of the "hidden buildings".

Taking into account the origin of the Italian cadastral system and in order to make the cadastral cartography completely usable and interoperable for achieving the fiscal policy objectives and for the land management policies, several project activities were put in place. This activities aimed at overcoming some critical issues arising from the process of creating the original (historical) maps and from the paper cartography computerisation phase.

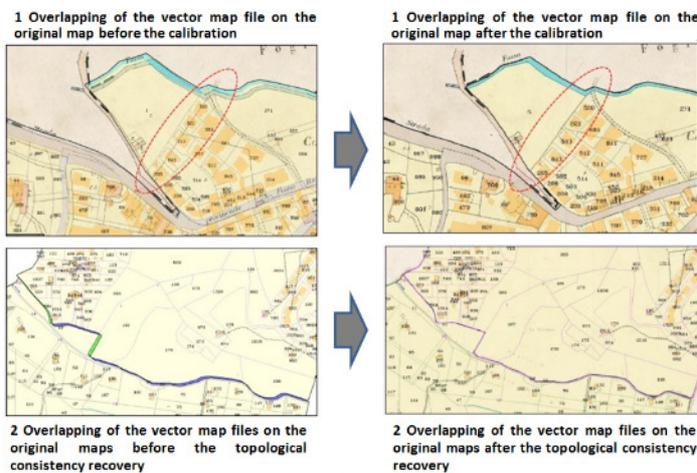


Figure 8: Recovery of maps accuracy and topological consistency between adjoining maps.

The above mentioned activities, together with other no less significant ones, show how *Agenzia delle Entrate* is constantly engaged to remove the residual limited critical issues and to constantly increase the quality level of the cadastral information managed, in order to make the cadastral system more and more reliable.

Session 2 – Netherlands, Romania, Slovenia, Croatia

Reliability of the Cadastre in a Digital World

Martin Salzmann (Netherlands' Cadastre, Land Registry and Mapping Agency, Kadaster)

In the Netherlands the land administration system enjoys a high level of trust. In practice we have created a well operating (largely digitized) system in close cooperation with financial institutions and notaries. Kadaster as an organization is responsible for the land registry and the cadastre. In the Netherlands we have a so-called deed system which over the years has reached a high level of legal security. This contribution focuses on the legal reliability of the cadastre function. We discuss this reliability from both a legal and information perspective. The information perspective has become more important as by now all functions have been digitized. We find that in practice users put a very high trust in the cadastre, but they are basically unaware that meaning of information is different in different contexts. We make a distinction between the following three "worlds":

- reality (or the real world) in which we live
- Institutional reality which is governed by the rule of law
- Administrative reality which are governed by the processes of governments

A physical boundary is visible in the terrain (real world). Its origins are the agreement between parties which has been laid down in a deed that is filed in the land register and has thereby become an institutional fact. The boundary and the resulting parcel are kept in the cadastre which in its turn is part of the administrative world. All these occurrences are related, but as the context differs have a different level of legal reliability (see Figure 9).

Following this approach, fact is that in the Netherlands the cadastre has no legal reliability, the cadastre has legal reliability in the public sector (administrative law stipulates that cadastre data are correct) and in the real world society puts large trust in the cadastral function. Setting out a boundary formally is providing information on its position, but society perceives it as a legal boundary.

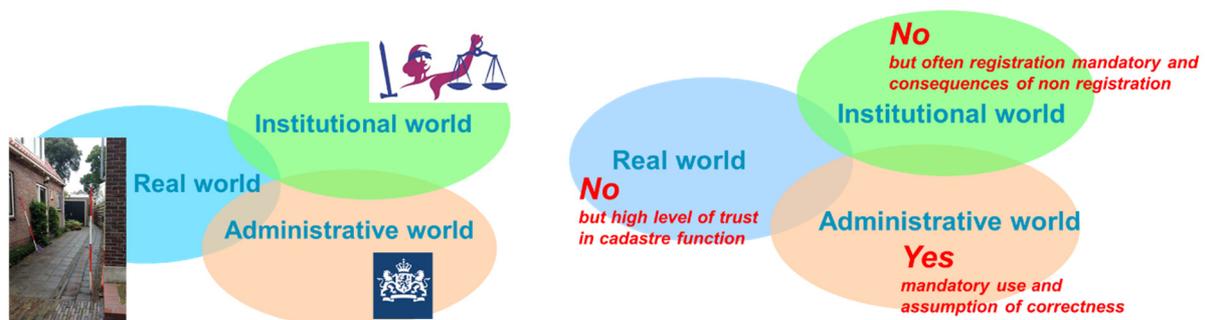


Figure 9: Real, institutional and administrative worlds (left) and legal reliability of the cadastral function (right).

Keeping this different perspectives in mind as Kadaster we have embarked in several strategies to bring the different worlds closer together. In that sense the cadastre in a legal sense is maybe still not fully reliable, but processes in the land market are supported by a higher level of reliability.

An example of such an issue is inheritance. If a rightful owner dies his or her heirs by law become the new rightful owners (this happens in the institutional world). The cadastre receives automatically a notification that this person has died and this is flagged in the cadastral registration (administrative world). All third parties are made aware of this fact. At the same time we do not know who will be the next rightful owner until a deed or declaration of inheritance has been booked in the land register and registered in the cadastre. In the real world, in the meantime, no issue arises. If one of the partners in a marriage dies, the other partner (again by law and unless arranged otherwise) obtains right usufruct of the whole inheritance. The real, administrative and institutional world are thus not in sync, the cadastre is not legally reliable and at the same time there is not a pressing need in society to solve the issue.

In order to remedy this situation we have made the booking of the declaration of inheritance free of charge in the land register and have advertised this widely with the notaries. We have seen some improvement, but the situation this occurs often.

In the cadastral surveying domain we see that in this digital age people use our cadastral map (which is a cadastral index map) as a means of setting out boundaries. This has never been the purpose of the map as we keep field sheets of the individual boundaries with survey information. We thus see a different perspective of the real world (where a fence or hedge may be considered as a boundary), the administrative world where the map only outlines the perimeter of the boundary and the institutional world where the intention of the parties in the field combined with the cadastral survey constitute the legal boundaries.

We are currently investigating whether we can improve the quality and currency of the cadastral map in a sense that it becomes more reliable with respect to boundaries.

Additional to these examples we are investigating more strategies to bring all three worlds closer together. Notable examples are finding ways to make adverse possession known, improving information on 3D properties and including all public restrictions in both the land register and cadastral registration. In general making information more accessible, usable and current helps to create a more reliable cadastre.

Summarizing we see that:

- Society increasingly relies on data and assumes cadastral data is correct;
- As cadastre we should be aware of different perspectives in modelling our information systems;
- Our objective is to bring the real, administrative and institutional worlds closer together (content and currency);
- Thereby increasing trust (that, however, will be perceived as better legal reliability).

Romanian Cadastre – a Trustworthy Institution for the Society

Eugenia Sas (National Agency for Cadastre and Land Registration, ANCPI)

As of 2004, the property registration activity in Romania takes place within a single institution, the National Agency for Cadastre and Land Registration (ANCPI), but the situation has not always been like this.

Throughout history, on the territory of Romania there have been two distinct property registration systems in operation: (1) the old land book, which was used on the territory of Transylvania and Northern Bukovina – a system based on the owner, where the parcels were identified based on their topographical number and there was issued a single land book for all the owner's properties and (2) the transcription-inscription system, applied in Moldova, Muntenia and Dobrogea, where no identification of the real estate was made, and the documents (mortgages, transactions, etc.) were registered in chronological order of their drawing, by years. This system had an information effect.

These two systems coexisted largely until 1996, when the need for the unification of the property registration system became stringent, and has been regulated by Law no. 7/1996 of the cadastre and real estate publicity, through which the technical evidence of the immovable assets was registered in the cadastre, and the respective legal rights were registered in the land book. Until 2004, the two functions were performed by separate institutions: cadastral registration by the National Office of Cadastre, Geodesy and Cartography, subordinated to the Ministry of Interior and the registration of rights in the Land Book through the Land Book Offices subordinated to the Ministry of Justice.

The transition to the market economy and the restoration of property rights as a result of the application of land laws have introduced a growing number of properties into the civil circuit. Their recording has put an increasing pressure on the existing system in order to meet the demands of the moment. Under those conditions, it was imperative that the complete registration activity (in terms of cadastre and land registration) of the property be modernized. Benefiting from the understanding of the phenomenon by the political class and its political support, in 2004 was established the National Cadastre and Land Book Agency, a modern and dynamic structure, the only state authority in the field of cadastre and land book in Romania.

Nearly 15 years since then, the National Agency for Cadastre and Land Registration manages a unified cadastre and land registry system, registering the property in Romania in two ways: by sporadic registration – or on demand – and by systematic registration. To complete the registration of all immovable properties in the cadastre and in the land book as quickly as possible, ANCPI is currently managing a national program of unprecedented size – the National Cadastre and Land Book Program, which aims to complete the systematic registration across the country by 2023. The program is funded from ANCPI's own revenues (EUR 900 million) and from European funds (EUR 312 million).



Figure 10: The National Agency for Cadastre and Land Registration.

The benefits of the unified property registration system already show effects in the national economy, like in designing and implementing Governmental policies in the field of national or local infrastructure, by contributing to the overall transport master plan and to the designing of local transport networks.

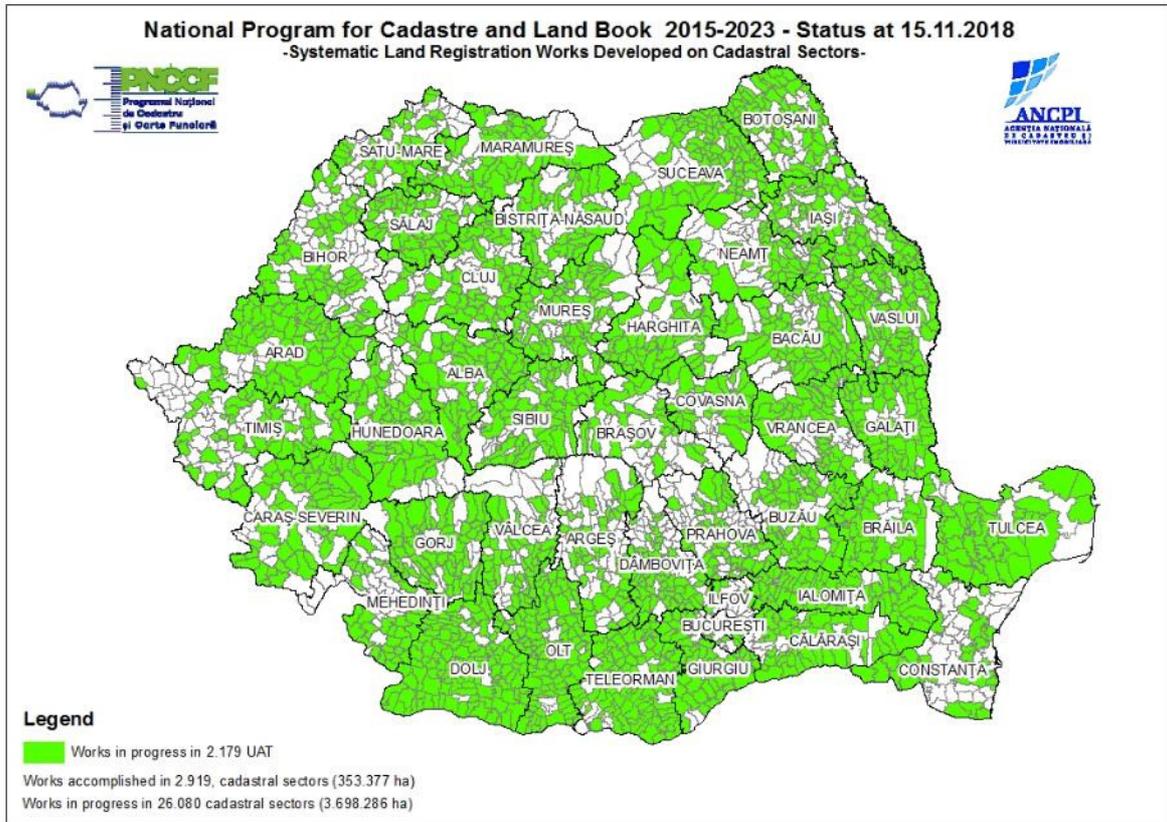


Figure 11: Status of Romanian systematic cadastre per sector.

Agriculture is growing, and farmers benefit more easily from subsidies granted under the Common Agricultural Policy. Thus, the rural economy becomes more dynamic.

Informal settlements are also recorded, which gives future opportunities to disadvantaged communities. Also public or private state properties are registered, which leads to its more judicious use. By registering all properties in ATUs¹, a full and real tax base is created for the benefit of local authorities and citizens.

The real estate market as a whole is becoming more dynamic and transparent, providing legal certainty to all parties involved: sellers, buyers, real estate developers, banks, and authorities responsible for collecting taxes.

¹ ATUs stands for "Administrative Territorial Units"; when all properties in a particular ATU are registered, then the systematic cadastre is considered to be accomplished.

Cadastral Data in the Republic of Slovenia and its Renovation

Metka Malnar (Surveying and Mapping Authority of the Republic of Slovenia)

The Surveying and Mapping Authority of the Republic of Slovenia (SMA) manages the following basic cadastral records: the Land Cadastre, the Building Cadastre and the Real Estate Register. The Land Cadastre records parcel data and the Building Cadastre data on buildings and parts of buildings. Attribute data from both registers are brought together in the Real Estate Register, where real estate data from various registers are recorded.

Cadastral data are used by land and building owners (for ownership management and other uses) and surveying companies in the provision of the surveying services. The data are also used by the municipal and state administration bodies as the basis for managing the policy of land management, environmental protection, real estate valuation, taxation and by various other users who need real estate data to carry out their tasks or projects.

Land cadastre data (excluding owners' data) are publicly accessible and free of charge. They are visible on the web portal E-prostor (<http://www.e-prostor.gov.si>), where users can view, order or download data. The real estate ownership is publicly accessible at the Land Registry, which is managed by the Court of Jurisdiction.

The SMA is responsible for regular data maintenance and improving the quality of the data. The renovation of cadastral data is carried out through regular maintenance procedures and cadastral data renovation projects, of which the main goal is the real estate data improvement and IT renovation of the real estate system.

Data analysis, data quality controls and other projects (e.g. Location Improvement of the Land Cadastre) are used for improving the quality of the data. Improved data will be migrated to a new Real Estate Records system, which will be a result of IT renovation and will ensure a simple and effective use of data (e-commerce).

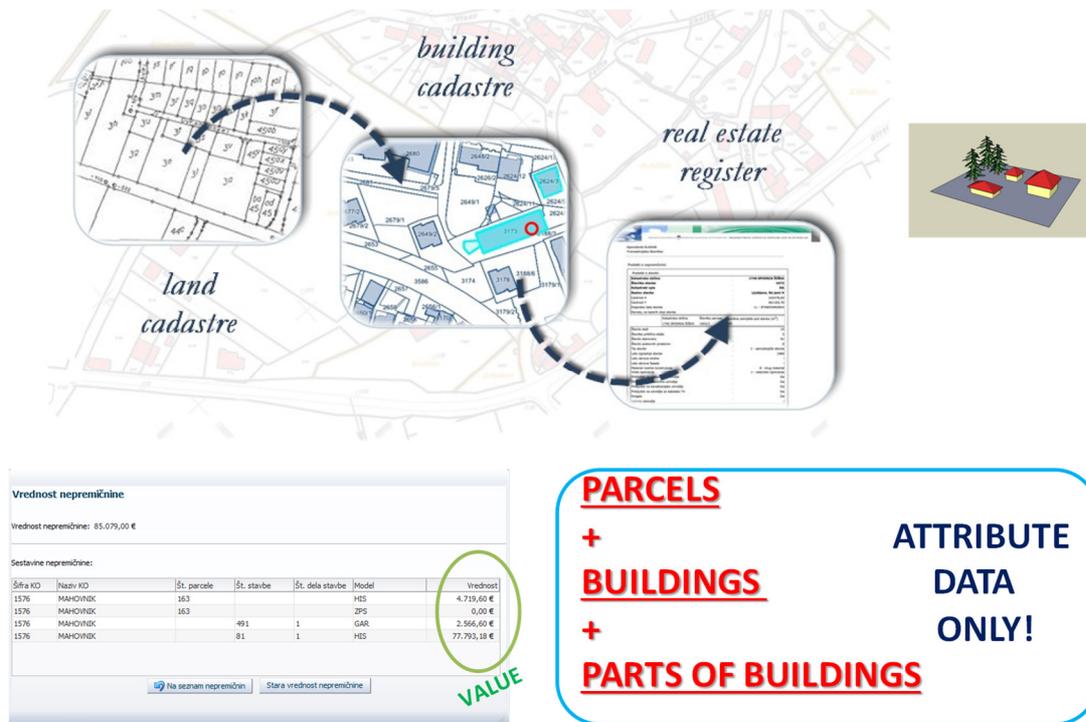


Figure 12: The Slovenian Real Estate Cadastre consisting of data from the Land Cadastre and the Building Cadastre.

Improved (digital) data and processes in the Land Administration System in the Republic of Croatia

Irena Benasić, Maja Pupačić, Damir Šantek, Antonio Šustić (State Geodetic Administration, Croatia)

The efforts of the State Geodetic Administration (SGA) to adjust the cadastral system to fully digital business operations, are all in accordance with the strategic documents of the EU and the Government of the Republic of Croatia (RoC).

SGA is a state administrative organisation performing administrative and other tasks (cadastre, topography, photogrammetry, NSDI, State survey, etc.) under the auspices of the Ministry of Construction and Urban Planning. SGA is responsible for cadastral maps and related data and conducts the maintenance of cadastral maps and other cadastral data in 20 regional cadastral offices and 92 branch offices. The Ministry of Justice is responsible for the registration of ownership and other real property rights

(land registers). Land registers are kept and maintained by land registry offices at municipal courts (land registries). 107 land registry offices are set up at 22 municipal courts.

Since 2000, SGA has conducted many programs standardizing the cadastral system throughout the RoC in organisational and technological terms. It is of paramount importance for the development of such complex systems that there are guidelines provided by the Government, dedicated civil servants and a well-developed private sector.

In order for us to meet the user expectations, we had to simultaneously improve and adjust the legislative system, develop and interlink IT systems, improve data quality and also train the SGA staff and outside users for cutting over to fully digitised business operations.

Many projects are implemented in order to raise the data quality and many services have been developed for the data distribution, sharing and exchange.

All preconditions have been met for fully digital business operations:

- A unified database and application for keeping and maintaining the land registry and cadastre data has been established – Real Property Registration and Cadastre Joint Information System **(JIS)**;
- Central point of access to SGA spatial data has been established - **GEOPORTAL**;
- Electronic issuing of public deeds (cadastral map copies, possessory sheet transcript/extract and Land Database extract) – One Stop Shop **(OSS)**;
- Self-service and free data searching and downloading for the purpose of producing digital geodetic reports - Digital Geodetic Report System **(DGRS)**;
- Delivery of actual (surveyed) coordinates in real time - Croatian Positioning System **(CROPOS)**;
- Electronic submission of digital geodetic reports (elaborates) - **DGRS&OSS**;
- Upcoming legislative changes also go in the direction of the **coordinate cadastre**, whereby a new step forward is made in perceiving the data quality.

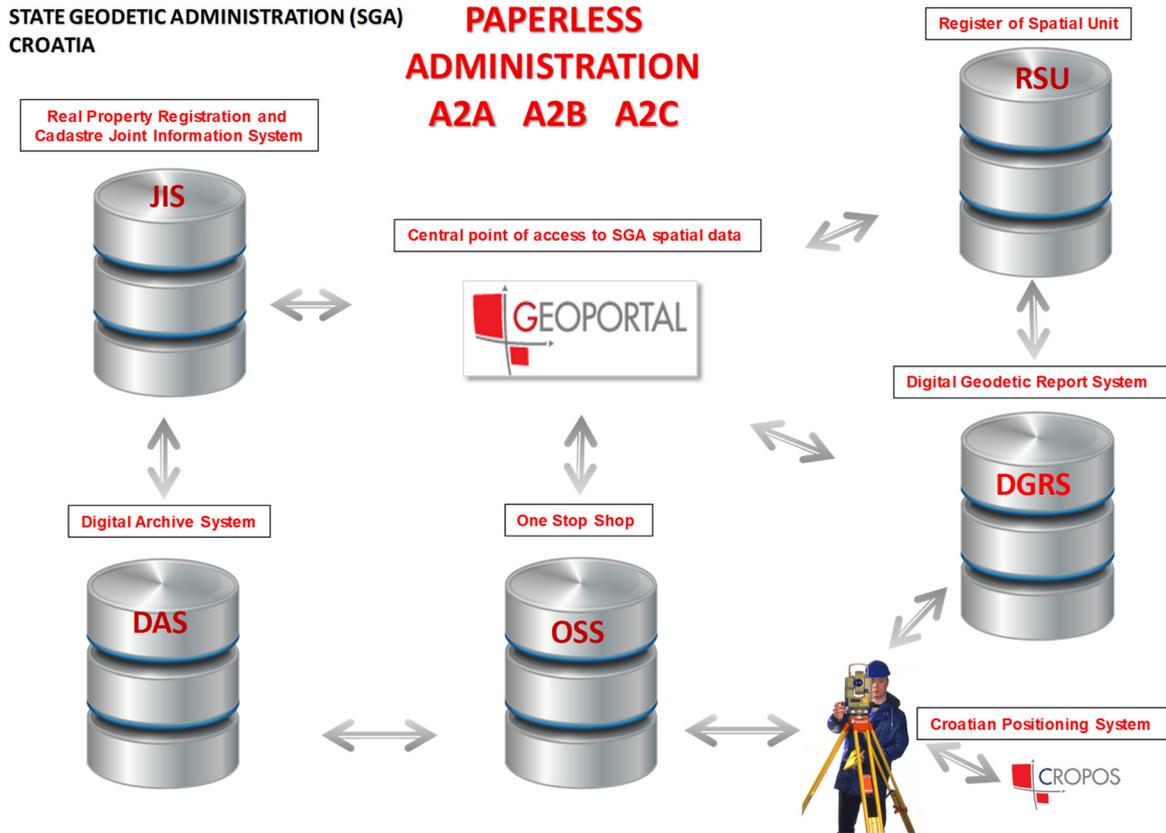


Figure 13: SGA IT system for paperless administration.

Session 3 – Greece, Czech Republic, Sweden, Estonia

Reforming the Greek Land Administration Framework

Dimitros Rokos (Hellenic Cadastre, Greece)

Within the Greek Land Administration Framework, the institution of the HELLENIC CADASTRE has been established in 2018 as the sole State Agency responsible both for the development and the operation of the Cadastre, as well as the maintenance of the System of Registrations and Mortgages in areas where cadastral surveying has not been completed yet.

The new agency aims to absorb the 390 existing registry offices over a period of two years and replace them with a network of 17 cadastral offices and 75 branch offices. This reform runs concurrently with the last phase of the cadastral development project in Greece, forming a very challenging environment for the next 2-4 years. A brief overview is given regarding the data and services that the Cadastre provides to the Greek society and public administration, but special focus is given to an initiative to digitize the whole workflow of the registration process in order to improve service provision, as well as, improve quality, increase transparency and reduce the cost of managing the system.

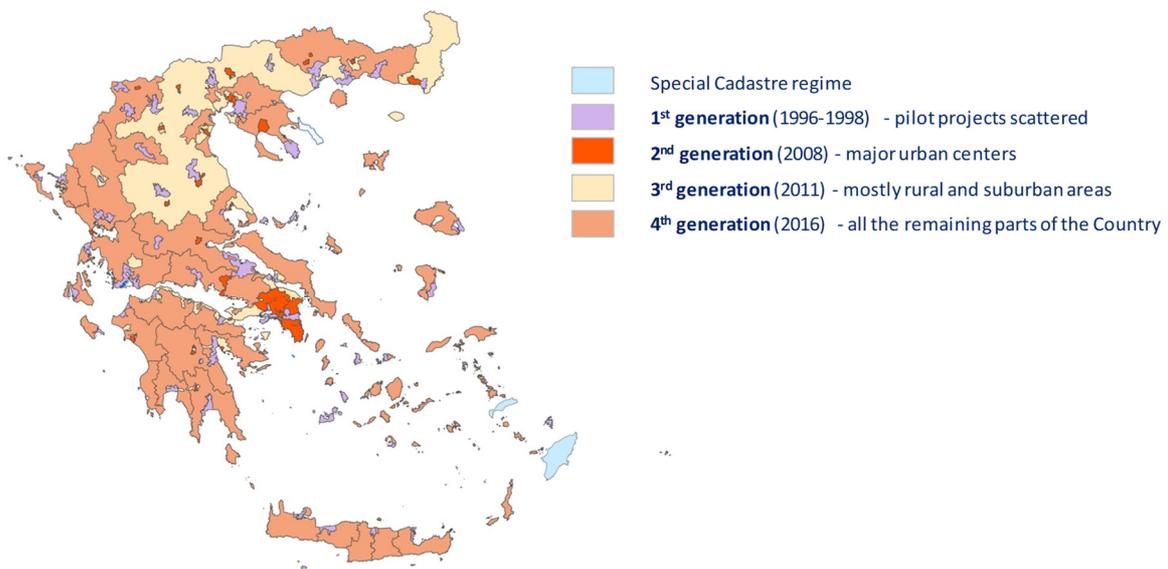


Figure 14: The Greek Cadastral Survey Program.

The (legal) Reliability of the Cadastre from a Czech Perspective

Martina Hercegová (Czech Office for Surveying, Mapping and Cadastre, Czech Republic)

In the Czech Republic, the competence of the cadastral authorities is not only to operate the Cadastre of Real Estate, but also the process of Land Registration. The most important principle of land registration in the Czech Republic is the principle of material publicity ("what is written is given"), which provides credibility to the data registered in the Cadastre of Real Estate.

The cadastral map in digital form has a uniform format throughout the Czech Republic. According to the original map (numerical or graphical), cadastral maps are divided into digital and digitized, but only at the working level. Both are in vector form and tied to the projection system of the national coordinate grid system. About 1/3 of the cadastral maps originate from the original measurement; their accuracy and therefore reliability is high. The other 2/3 of the maps are based on graphical maps of fathom scale. Their digitalization was carried out by vectorization of raster images of cadastral maps.

In 2017, a long-term concept was issued by the Czech Office for Surveying, Mapping and Cadastre in order to improve the quality of the technical part of the Cadastre. The most important issues are:

- Insufficient geometric quality of digitalized cadastral maps.
- Discrepancies between registered data and the actual situation in the field.
- Out-of-date technical data already registered (in particular data on land types, land use, type and mode of property protection).



Figure 15: Digital Cadastral Map from Czech Republic with indication of refined and agreed boundaries (green) and less accurate non-agreed boundaries (green).

The problem of insufficient geometric quality can be solved by new mapping within the next 20-30 years. The problem of discrepancies between registered data and the actual situation in the field can be solved by carrying out revisions. The decision was taken to devote capacities to these activities to improve the quality of the technical part of the Cadastre.

The Swedish Real Property Register – Information Quality and Challenges Ahead as to a Smarter Planning and Building Process

Magdalena Andersson and Anders Svensson (Lantmäteriet, Sweden)

Sweden has a long tradition in the registration of land since the 13th century until today. The information has been recorded in the Real Property Register, where the properties of Sweden have been stored using different methods in both the analogue as well as the digital era. Today, the use of information has changed from more of a signal system towards a decision-making system. This puts high expectations on the quality of the information.

The number of population in Sweden is rapidly increasing, and therefore new demands are made by the government:

- Increase construction and simplify the planning and building process;
- Digital first; take advantage of possibilities with digitization, faster decisions, cost effective etc.

Lantmäteriet has been given a mandate from the government to coordinate activities to simplify the community building process together with Boverket, the National Board of Housing, Planning and Building.

The development of the textual part of Sweden's Real Property Register begun in 1968 (finished 1995), when the transfer of the information from cadastre and land register books started. In 1992 (finished 2017) the work to create a national digital map data base started, where the land-use maps (1:10 000) were used as foundation. To capture the information, maps were scanned or digitized manually. Because information has been collected from different data sources and in different ways, activities to improve quality are needed. Demands from society are also changing other time due to e.g. new possibilities given by digitization.

To be able to meet new demands Lantmäteriet works with a lot of activities; e.g.:

- Long-term strategic goals/plan to raise the quality, "Property information 2025";
- Structured ongoing work to improve the quality;
- User needs and community benefits;
- Openness and security;
- Standardization of basic data;
- National cooperation in geodata collection;

- National platform for geodata;
- Competence.

It is a job to be persistent with; because changes do not happen in a day.

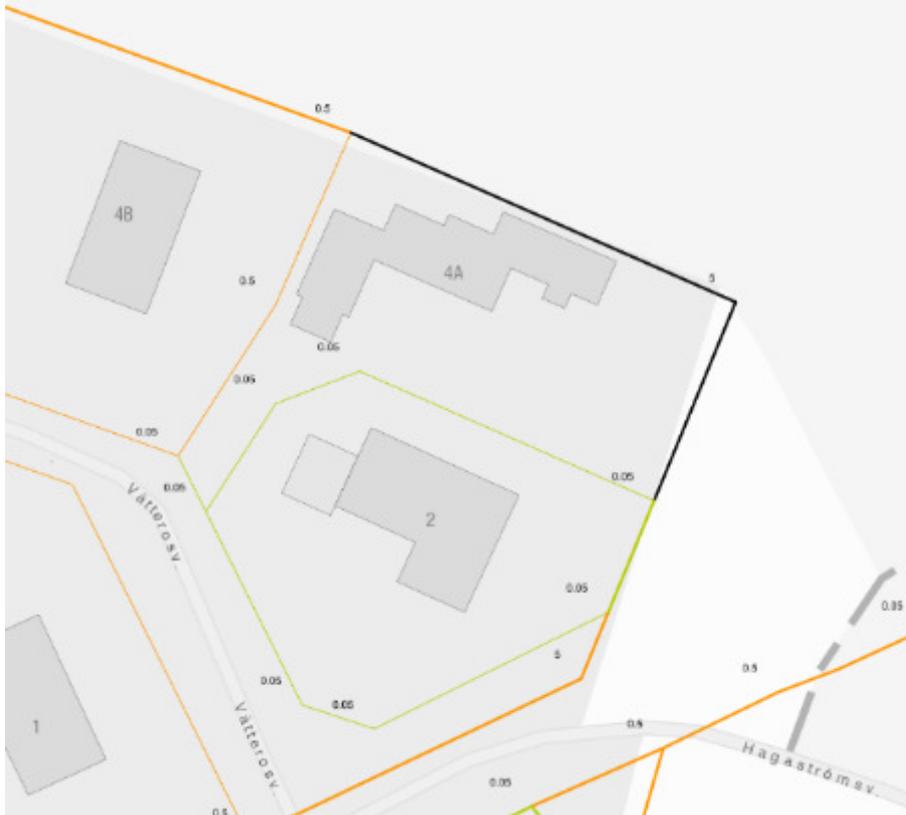


Figure 16: Example for the visualization of the quality of the boundaries.

New Trends and Developments in the Estonian Cadastre

Tõnu Kägo (Head of the Quality Department of Cadastre, Estonia)

In November 1992, the first cadastral parcel was registered in the Estonian Land Cadastre. As of today, the total number of parcels registered in the Estonian Land Cadastre is 704 700. Land is under reform (restitution, privatisation, land is retained in state ownership, land is transferred into municipal ownership) and real properties are formed. Land reform in Estonia, however, is almost finished. As of November 2018, 99.0% of the Estonian territory is registered in the Land Cadastre. There is an active real estate market and the economy is booming. Over all these years, the Cadastre has been a tool for the implementation of land reform. It was needed in order to reflect the status of land reform – to whom, in what way, where and how much land was given into ownership. Expectations regarding the land cadastre have changed over the last years. Now it seems that different land management procedures

are needed, which will allow for easy, quick and inexpensive land management activities, and thus increasing the turnover in the property market.

In order to facilitate the acquisition of land for public interests, the Acquisition of Immovables in Public Interest Act was adopted recently. Altogether, there are over 20 laws and acts that have been changed to support land acquisition for the Rail Baltic project, making the process easier, fairer and more transparent. Among other acts, also the Land Cadastre Act was amended, which now allows to meet several needs:

- introduction of partial (cadastral) surveys of the parcel to solve the needs of practical life;
- introduction of a new system of notations ("Area is inaccurate" and "Necessity to determine property boundary") that would reflect the quality of the cadastral data;
- a fundamental change is that the cadastral registrar has the right to form a parcel with an entry based on the data obtained from the land surveyor; before it was fully the land surveyor's responsibility to calculate the area of the parcel and to determine the land use/cover type;
- the cadastral registrar determines the scope of the cadastral survey;
- the cadastral registrar may divide parcels, provided that suitable base data are available;
- the cadastral registrar may carry out land consolidation electronically, provided there is no need to determine a new boundary point in the field;
- the cadastral registrar has the right to correct cadastral data on the basis of the Estonian Topographic Database (ETD);
- the ETD has been integrated into the cadastre, the new land use/cover type for each parcel will be determined on a regular basis each year.



Figure 17: Cadastral registrar in Estonia may divide cadastral parcels electronically.

All this has been introduced in order to improve the quality of cadastral data. We are convinced that the increase in the quality of cadastral data will also be facilitated by the fact that from the year 2020 on, only the natural person holding occupational qualification certificate of land management and land surveying license issued by the Estonian Land Board can be active in the field of cadastral surveying. As well as the fact that since July 2018, the cadastral data in Estonia are open data. But we also understand that improving the quality of cadastral data is a never ending process.

Session 4 –Cyprus, Spain

Department of Lands and Surveys of Cyprus – An integrated Land Registry and Cadastre

Integrating Data (Legal/Fiscal/GIS): A Strategic Advantage, Open Data and The DLS Portal

Neoclis Neocleous (Department of Lands and Surveys of Cyprus)

The Department of Lands and Surveys "DLS" is probably the most important pillar of socio-economic development in Cyprus, as it deals with Immovable Property, which is one of the leading factors for progress, prosperity and development in the Cypriot economy. With its present operational structure and responsibilities, through a wide range of Laws and Regulations, the Department is one of the most essential services of the Public Sector, providing the basis for the design of all development programs relating to Immovable Property and making a most important contribution to all the sectors of activity of the Cypriot society. The system of land registration in Cyprus is a system of Registration of Title (Title System). A registered person is considered to be the undisputed owner of the property and his title to ownership is absolute, subject to the Director's power to correct errors or omissions under certain circumstances, and the inherent power of the Courts to order the amendment or cancellation of a registration. Reliability is one of the core strengths of the DLS Land Registration / Cadastre System.

The Department through its multidimensional role is solely responsible for the provision of services in connection with all the rights relating to Immovable Property - registration, valuation, general assessment (for tax purposes), tenure, surveying, cartography, geodesy and hydrography, as well as the management of all property belonging to the State.

Undoubtedly, DLS is the main source of data relating to Immovable Property. The data in conjunction with the procedures generating and supporting them are the main and core asset of the Department, providing value added and a strategic advantage. Their further use and utilization becomes an imperative need, as these data in order to be productive, should first of all be structured correctly and at the same time, through interoperable means and technology, be available primarily horizontally, across the Public Sector, to other bodies, businesses, researchers and ultimately the citizen himself. DLS unique ability to hold / integrate and manage fully reliable and interoperable Registry / Legal, Fiscal and Cadastre / GIS data, positions it as one of a kind globally. The Department collects a plethora of data relating to real property manuscripts of over 100 years old and computerized data of more than 35 years old. Data collection is part of its daily operations, as well as part of broader data collection projects, both in the field, and through new technological forms.

DLS has set as a primary objective, the implementation of a new IT Strategy, the "DLS IT Strategy", which has been prepared for upgrading the IT in the Department and already being implemented. A

medium-term outcome of this Strategy is the implementation of the new Internet e-Services platform of the Department, the "DLS PORTAL". The New Internet Services platform (has been recently awarded with the 2018 Innovation Award) is a landmark in the modern history of DLS, as following intensive efforts lasting many years, DLS fully opens its doors to the outside world, with Open Data and Online Services via the Internet, through its own platform of electronic services; the whole concept is based on a 24 hour available, fast and friendly service.

A new IT customer-centric culture has been embedded in DLS's vision, focusing on the citizen via the availability of e-Services. The provision of effective services to citizens and the two-way communication with them is the top priority for DLS. This is achieved through the necessary redesign and reengineering of processes, the establishment of ISO standards, the investment in people as a value-added factor, the enhancement of access and services through a friendlier infrastructure and finally, the implementation of state-of-the-art IT technology; the latter is further enhanced and supported by one of the largest IT scale projects of the Cyprus government already taking place – the new Cyprus Integrated Land Information System consisting of the upgrade of a) the DLS Geographical Information System and b) the upgrade and extension of the DLS Legal and Fiscal IT System.



Figure 18: Image of the DLS portal.

Methodology to Improve Urban Cadastral Cartography in the Spanish Cadastre

Amalia Velasco (Spanish Cadastre)

The cartography of the cadastral GIS has been created through the digitalization of information from different sources made with different media, which now due to the development of technology have been significantly improved.

In addition, as the cadastre is updated continuously and is maintained in a collaborative way involving municipalities and other administrations working in the territory, the data sources that provide cartographic information to the large cadastral GIS are varied and range from high-precision surveys to sketches made on orthophotos or urban planning maps.

The cadastre homogenizes this information in the maintenance process when incorporated it into the system, however with the new uses of cadastral information the cadastre has ceased to be just a fiscal instrument and has become basic information for all policies that act in the Territory.

This makes it necessary to improve the quality of cadastral cartography. Fortunately we have now new technological tools and in particular in Spain we have orthophotos of high precision and frequency available that facilitates us to undertake this process of improvement of the quality Cartographic.

When the cadastre also becomes the basis of the registration of the properties, as has happened in Spain with Law 13/2015, which indicates that once coordinated a property between cadastre and property right register, the area and location of the property in cadastre becomes legal value; the quality of the graphic representation becomes fundamental.

Therefore the strategic plan of the Spanish Directorate for cadastre includes the process to update both the positional accuracy of cadastral cartography as the correct reflection of the real estate on it.

Since it is impossible to do all the cartography again, as a first step in this process of improvement of the quality, the cadastre is carrying out throughout all the country a diagnostic process of the cartographic quality of the urban blocks. This diagnostic has been contracted to external private companies and will allow us to know the existing displacement, turns or translations as well as the typified errors presented by the cartography.

With this diagnosis it will be possible to decide which blocks can be adjusted automatically, with which parameters and which of them have to be undertaken with a more exhaustive field work. In addition, the quantification and typing of errors will allow us to plan the posterior actions.

These diagnostic works will be followed by the correction process and subsequently by the extension of the plan to rural areas. And, of course, it will also be necessary to define the administrative procedure within the legal framework and how to notify the citizens and allow them to claim possible errors.

So the process has only begun and in the coming years we will make a real effort to improve the Spanish cadastral cartography.

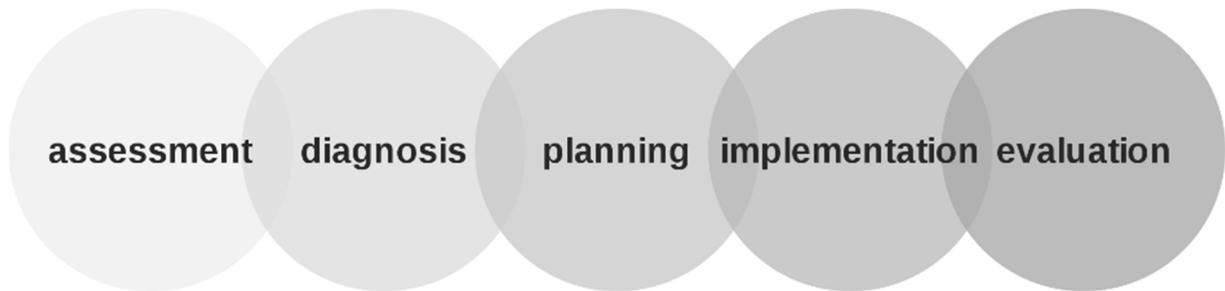


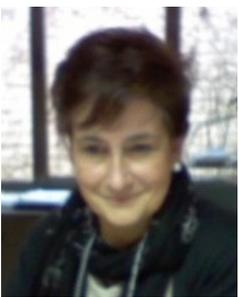
Figure 19: Steps in the development of the Spanish cadastral cartography.

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