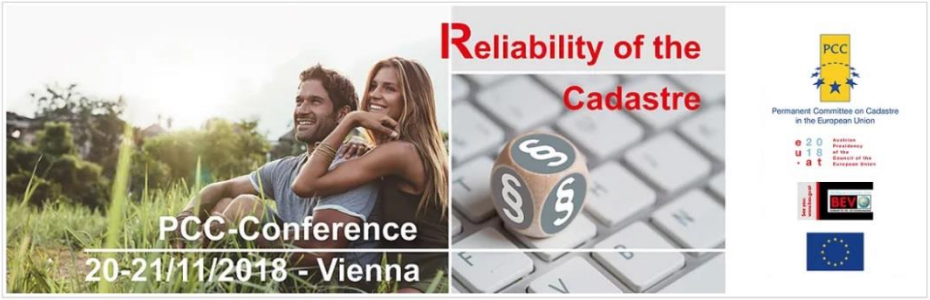

Reliability of the Italian cadastral system

data quality and improvement prospects

Eng. **Franco MAGGIO**
(Central Director for Cadastral, Cartographic and Land Registration Services)

Eng. **Arturo ANGELINI**
(Responsible for the Cadastral Operating Methodologies Office)

Agenda

Reliability of the Italian cadastral system

data quality and improvement prospects

Data quality characteristics and critical issues

The main data quality improvement activities put in place

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Reliability of the Italian cadastral system

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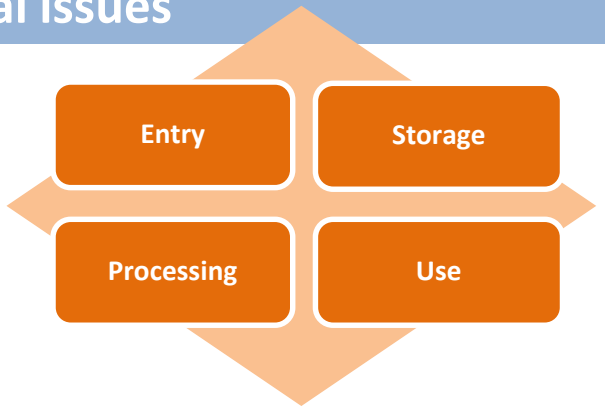
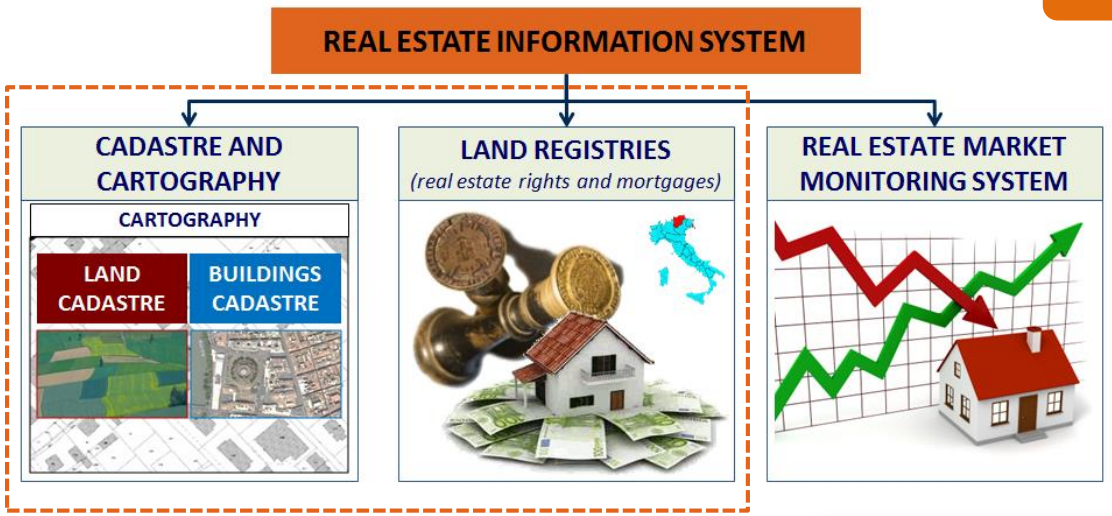
Data quality characteristics and critical issues

The cadastral information system

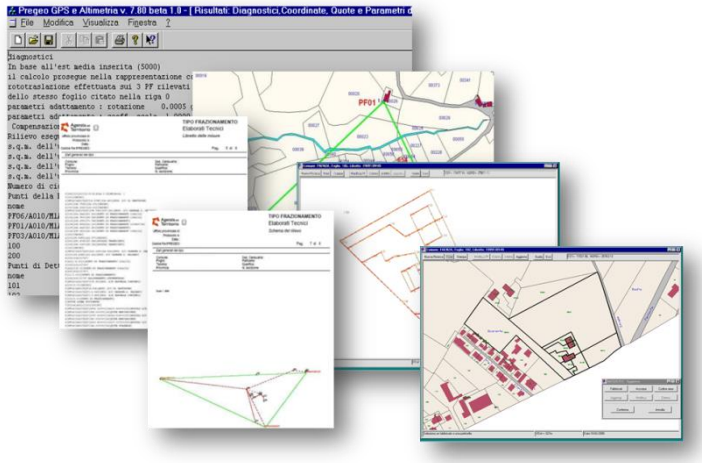
It is the component of the Organizing System of the Italian Cadastral Administration that manages the related informative processes





The cadastral data

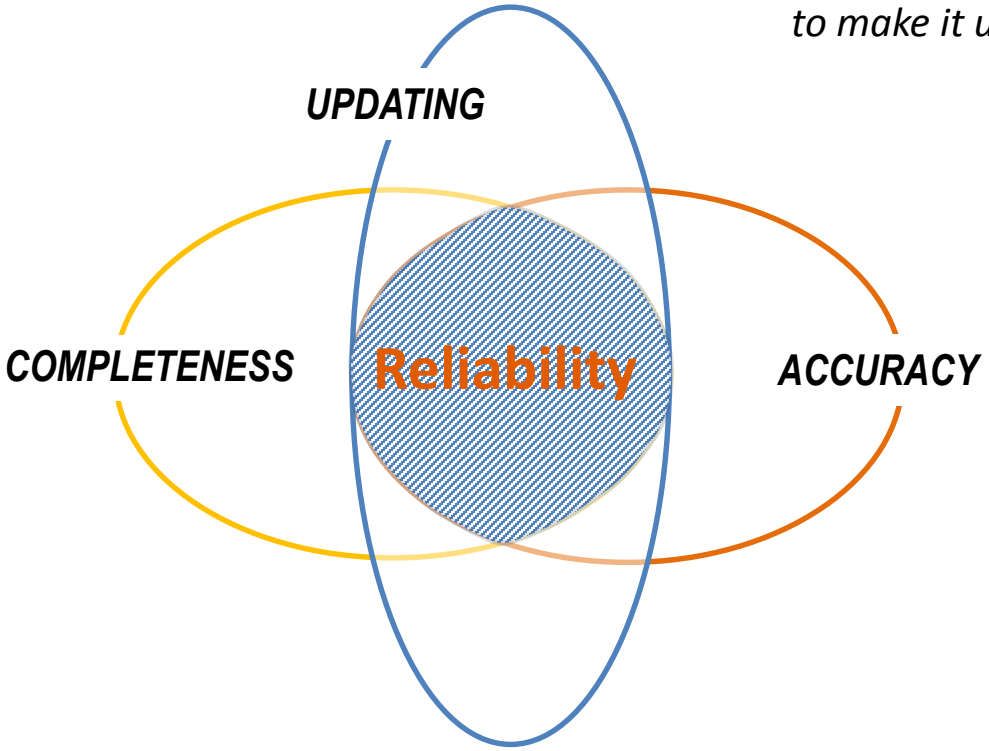
It is the informative element of the system: a complex entity consisting of several components different in nature: *technical, economical, juridical, descriptive, geometrical, graphical.*



Data quality characteristics and critical issues

Data quality characteristics

- **COMPLETENESS** – *the presence in the DBs of all the expected information is necessary for a correct understanding*
- **ACCURACY** – *information has to be accurate and consistent with each other*
- **UPDATING** – *information has to be constantly updated in order to make it useful*



The RELIABILITY of the Italian cadastral system is the aptitude to produce over time integrated, consistent and updated information without errors

Data quality characteristics and critical issues

CRITICAL ISSUE – The Origin

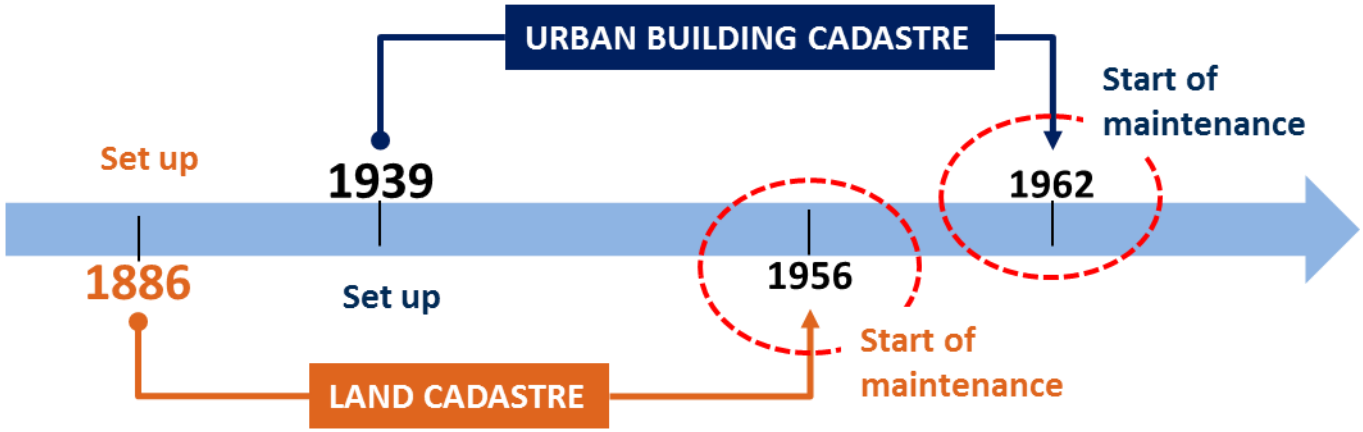
22 different Cadastres, only **8** of which based on geometrical data

1861 – Cadastres before the Unification of Italy

Aim of the Italian Cadastre at 1861

1. **Uniform principles and procedures** for the whol national territory
2. **Based on geometrical data** (parcel based with regard to its shape, size and georefence)
3. **Equalization of land taxation**

CRITICAL ISSUE – Time necessary for the implementation



Data quality characteristics and critical issues

CRITICAL ISSUE – The structure and the contents of the cadastral archives

Comprises four archives which are different in nature (alphanumerical or graphic)

LAND CADASTRE

CENSUS ARCHIVE

includes **technical and descriptive data** related to the **rural parcels**

CARTOGRAPHIC ARCHIVE

includes about **300,000 maps** in vector format

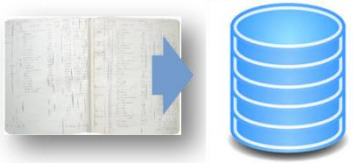
(344,000 cartographic files)

about **60 million** inhabitants

about **300,000** square kilometres

URBAN BUILDING CADASTRE

CENSUS ARCHIVE

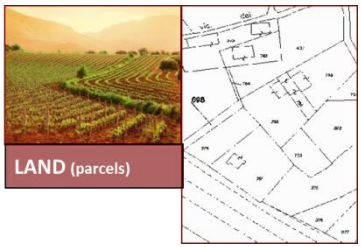


includes **technical and descriptive data** related to the **real estate urban units**

PLANS ARCHIVE

includes graphic information (**plans**) related to **each real estate urban unit**

LAND CADASTRE



*about **85,5** **millions** of cadastral parcels*

URBAN BUILDING CADASTRE

*about **73,5** **millions** of buildings or parts of them*

CRITICAL ISSUE – Updating based on the owner declaration

Updating is essentially delegated to real estate or land owners, through technical professionals qualified to draft cadastral updating documents

Agenda

Reliability of the Italian cadastral system

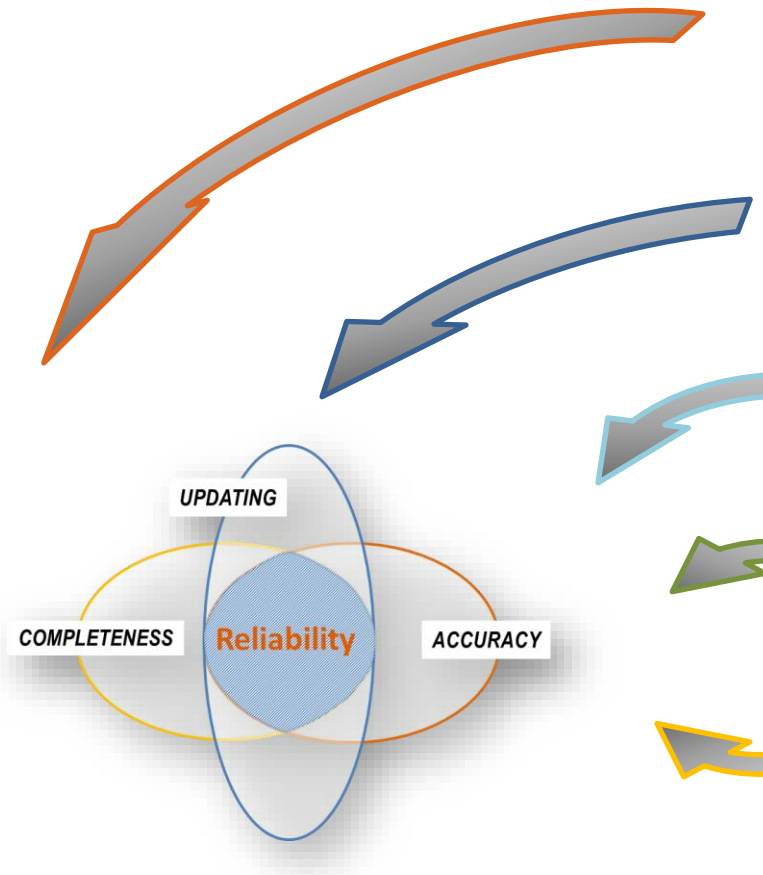
data quality and improvement prospects

Data quality characteristics and critical issues

The main data quality improvement activities put in place

The main data quality improvement activities initiated

Reliability of the Italian cadastral system

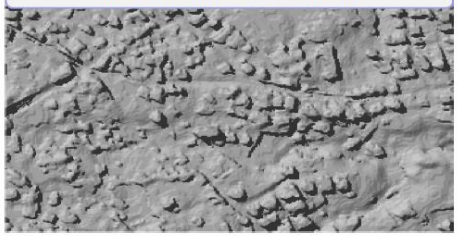


Some of the main activities put in place

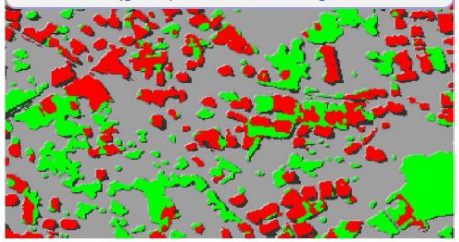
- **a** *The identification of "hidden buildings"*
- **b** *Activation of the "Register of Holders (AdT)"*
- **c** *The national archive of urban streets and house numbers "ANNCSU"*
- **d** *Rural buildings to be registered at Urban Building Cadastre*
- **e** *Improvement of the quality of the cadastral mapping system*

The identification of “hidden buildings”

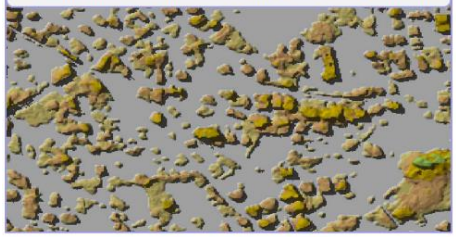
Elevation Surface Model (ESM)



Classification of buildings (red) and vegetation (green) with infrared images



Classification of objects aboveground based on height



Automatic identification of buildings not present on the cadastral map

Automatic identification of buildings not declared to cadastre

Results

7.759 Municipalities involved in detection and regularisation activities

2.228.000 Cadastral Parcels detected and come out

Increase of **825** Milions of € in cadastral income

Ascription of cadastral income to **1.261.000** real estate units

769 thousands with final value

492 thousands with temporary value

b Activation of the "Register of Holders (AdT)"

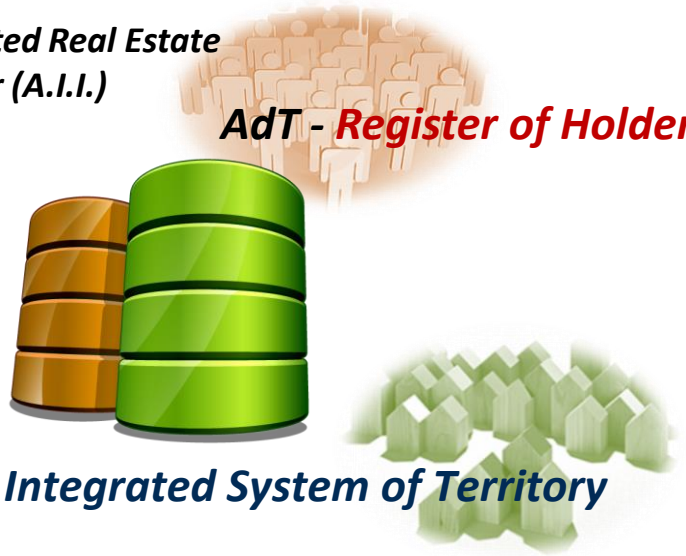
D.Lgs. 78/2010

The **Register of Holders (AdT)** is part of a wider project for the implementation of the ***Integrated Real Estate Register (A.I.I.)***

The main purposes of the activation of the **Integrated Real Estate Register** are the:

- full **integration of the databases** available to the Agency made and historically managed as different systems
- to provide effective support to the general and local real estate taxation, to **correctly identify OBJECT and SUBJECT**

Integrated Real Estate Register (A.I.I.)

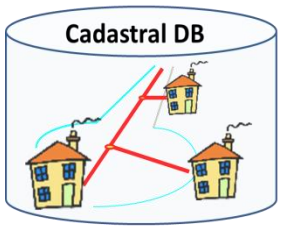


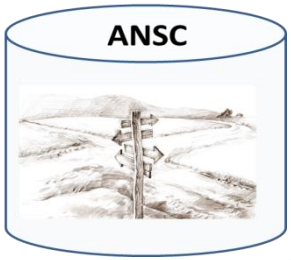
1. It allows to define the **correct identification of the subjects** holding title to a property for tax purposes
2. improves **data quality** through the qualified representation of their relationships and the full integration of cadastral and land registry archives

C The national archive of urban streets and house numbers "ANNCSU"

Agreement
Agenzia - Istat

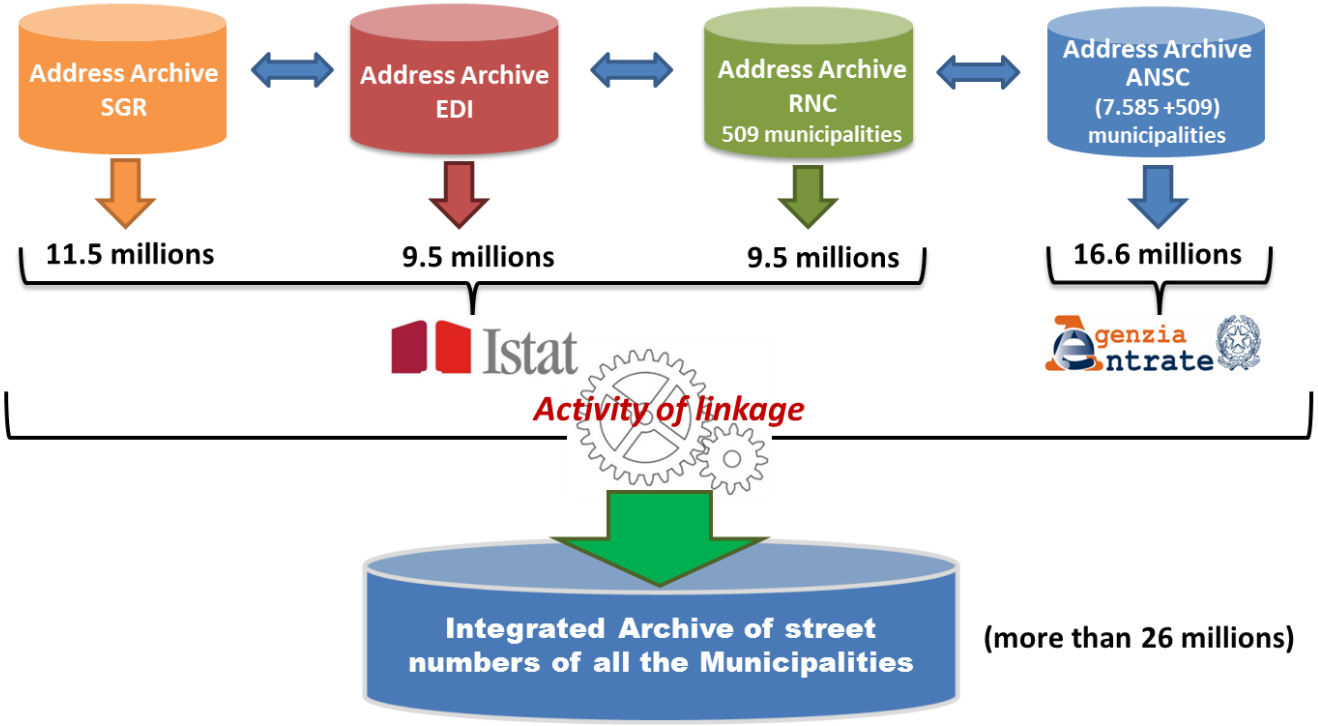
House Numbers and Street Names National Register (ANSC)





First **ANSC** establishment, which contains the Street names' registers of all the Italian Municipalities, was initially carried out on the basis of **toponyms contained in the addresses of the housing units registered in the cadastral database, integrated with external sources**

From ANSC to ANNCSU (House Numbers and Street Names National Register)



Strengthening of ANSC in ANNCSU, through the integration of the archives

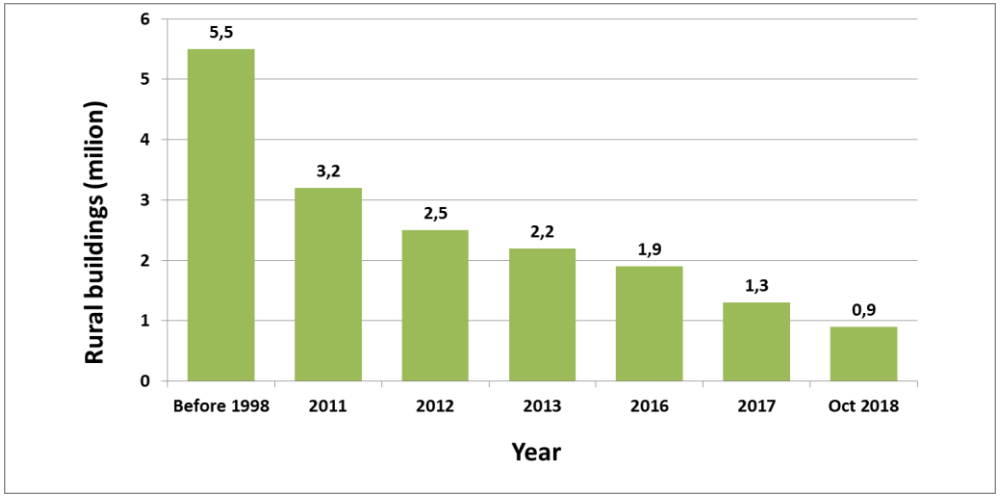
Rural buildings to be registered at Urban Building Cadastre

- Till 1994 the **Rural Buildings** were registered only in the Land Cadastre (representation in the map and description of use)

- By Law n. 133 of 1994 the registration of the Rural Building in the Urban Building Cadastre (that took the name of comprehensive **BUILDINGS CADASTRE**) was provided.
- In order to put in evidence the "rural character" of a building registered in the Buildings Cadastre, for the fiscal advantages close connected to this condition, the law by decree n. 201 of 2011 provided a specific cadastral annotation for the buildings under this condition.

- In order to press the owner for the declaration (mandatory) to the Buildings Cadastre of the Rural Buildings, the Cadastral Administration carried out several communication at national, regional and provincial level.

Rural buildings to be registered at Urban Building Cadastre



Till **1998** the rural buildings registered only in the Land Cadastre were about **5,5 millions**

At the beginning of **2011**, the rural buildings still registered only in the Land Cadastre were more than **3,2 millions**

After the coming into force of the law by decree n. 201 of 2011, this number was constantly decreasing :

- **2,5 millions** in **2012**
- **2,2 millions** in **2013**
- **1,8 millions** at the end of **2016**
- **1,3 millions** at the end of **2017**
- **0,9 millions** at October **2018**

The rapid decrease observed in the last years depends both from the owners declarations and from activities carried out by the cadastral Administration in order to remove errors in the cadastral DBs

Evolving projects of the cadastral cartographic system

The **project activities** are aimed at overcoming some critical issues **arising from**:

- **the process of creating the original (historical) maps**
- **paper cartography computerisation phase**

Evolving projects of the cadastral cartographic system

The carrying out of these activities makes completely **usable** and **interoperable** the cartographic information required for achieving the ***fiscal policy objectives*** and for the ***land management policies***

The main undertaken projects:

1. **Recovery of maps accuracy and topological consistency between adjoining maps**
2. **Remaking of the cartography in the *Lombardia* Region**

Evolving projects of the cadastral cartographic system

Recovery of maps accuracy and topological consistency between adjoining maps

Causes

*The **transposing** of the cadastral cartography **from paper to a digital format**, carried out through the acquisition of the cadastral maps raster images, then digitalised to get related files in vector format, caused a deterioration of the map precision, making it necessary to recover the distortions of vector maps.*

Goals

Improve the QUALITY of cartography

Improve the usability of WMS services and the "Geoportal"

PROJECT ACTIVITIES

Removal of the distortions existing in the digital vector maps

- **Step 1** — **Distortions adjustment** of the original maps – **geo-referencing** of the original maps
- **Step 2** — Accuracy recovery of the digital vector maps through **calibration** on the original maps

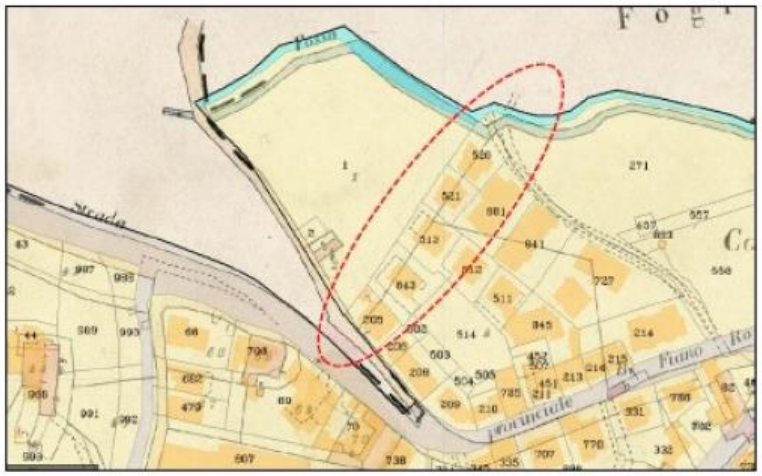
Creation of the topological consistency between adjoining maps

- **Step 3** — Automatic creation of the topological consistency between adjoining maps using the raster images of the original maps

Evolving projects of the cadastral cartographic system

Recovery of maps accuracy and topological consistency between adjoining maps

1 Overlapping of the vector map file on the original map before the calibration



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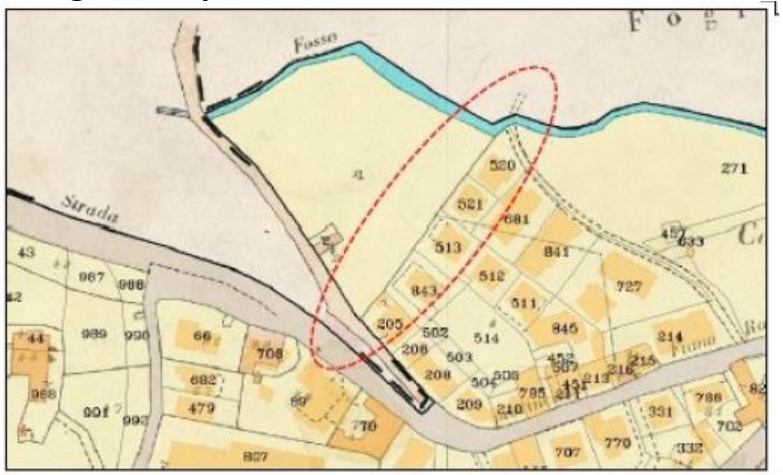
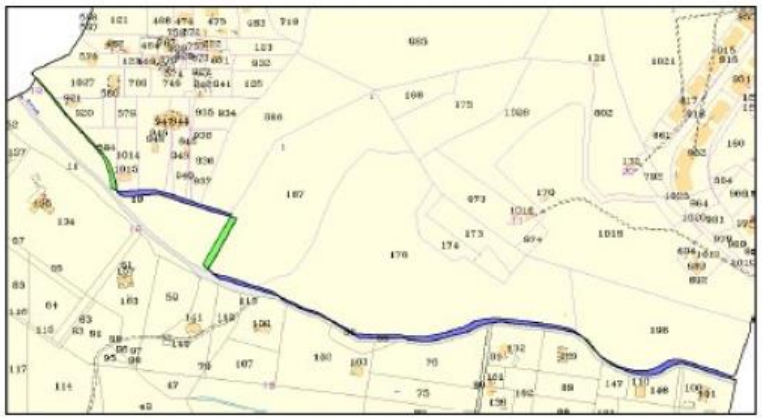
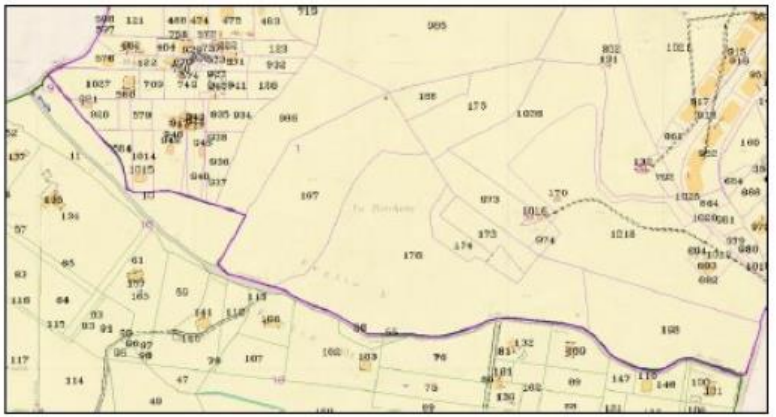




2 Overlapping of the vector map files on the original maps before the topological consistency recovery



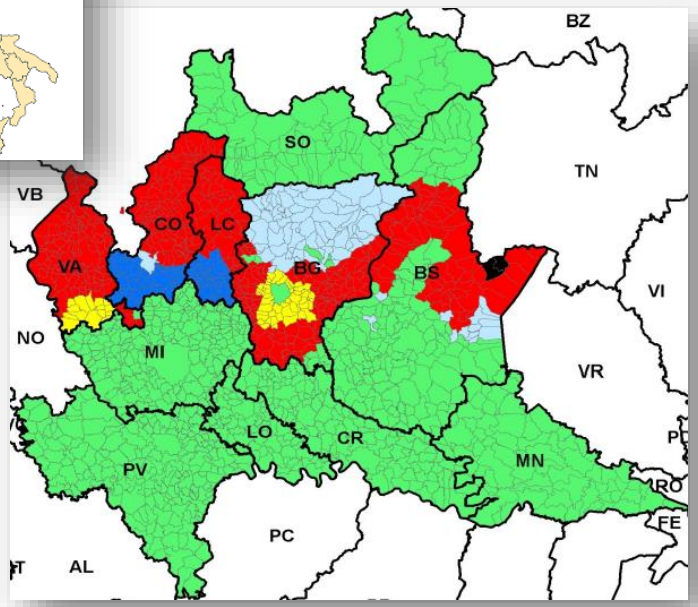
2 Overlapping of the vector map files on the original maps after the topological consistency recovery

Evolving projects of the cadastral cartographic system

Remaking of the cartography in the Lombardy Region

Causes

About 15,000 cadastral maps coming from the cadastres existing before the unification of Italy, included in some Provinces of Lombardy, made using the open ***perimeter system****,* ***not referred to any reference points network*** *and* ***surveyed through the plane table****, oriented to the North through a compass.*



Goals

To create a new cadastral cartography in these territories

Improve the QUALITY of cartography

Improve the usability of WMS services and the "Geoportal"

- ***Grundbuch system***
- ***Ordinary cadastral maps (parcel with close perimeter)***
- ***Pre - Unification maps (parcel with open perimeter)***
- ***Availability of maps derived by aero photogrammetry in the '90, but not yet under the maintenance phase***
- ***Availability of maps derived by aero photogrammetry in the '80, but not yet under the maintenance phase***
- ***Availability of maps surveyed on the ground in the '70, but not yet under the maintenance phase***

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Many thanks for your kind attention