THE REALIZATION OF STATISTICAL REPRESENTATIONS BASED UPON UPDATED CADASTRAL DATA OF A VINEYARD UNIT LIMITROPHE TO THE CITY OF IASSY

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Abstract: *To achieve statistical representations based on basic and specialized data from cadastral records, was monitored, during 1989 - 2010, a vineyard unit limitrophe until 2007 with the inside of the City of Iassy. For this purpose, has been updated, in phases, the cadastral data through technical standards under the existing law regarding the introduction and execution of general cadastre and informational systems by activity fields. Also, it is wanted to be capitalized by the user the basic and specialized data, from the cadastral records, by rapidly obtaining the statistical representations, based on real and accurate information gathered on the field, regardless of their volume and complexity. So, in the case study, are highlighted the operations and data resulting from monitoring cadastral changes.*

Keywords*: Vineyard cadastre, digital cadastral plan, cadastral plot, cadastral data, statistic representation.*

1. Introduction

By the data from the cadastral records of General Cadastre Informational System centralized and selectively processed, may result topographical and cadastral maps and plans specific to each area of economic activity [10, 11]. The purpose of these systems is to provide real data on terrains and buildings of all types and their owners or possessors, respectively of more efficient evaluation and capitalization. Only by introducing the Cadastral Informational Systems by fields of activity and analyzing in time of the way how resources are used can talk about sustainable development, environmental protection, rational use of land through regional planning works, for preventing the chaotic development of habitable areas, the development of the real estate market through systematic studies and urban planning. Unfortunately, unlike the majority of the European Union member states, Romania does not features of a land fund general cadastre, containing essential data regarding the technical, economic and legal situation of the real estate from public and private domain, on the level of administrative territory [2]. Also, the efficiency of automation of cadastral works increases when processing and analyzing data and information can be made quickly and easy, so they reflect, at any time, the reality on the field [1].

The importance of updating these data and information regarding the shape, area, category of use, the owner and others are due to real estate movement dynamics in a society, whose market economy is in continuous changing. The rapid consultation, by the policy makers, of cadastral documents, whose data and information was updated regularly, is only possible if these documents are computerized [8, 9].

2. Method presentation

The objective of studies consisted in monitoring the cadastral changes in the location of 111 ha of the former vineyard unit Copou Vineyard of Iassy, which became through privatization Vinifruct Copou Company of Iassy and, since 2007, has been included in the extended inside of the City of Iassy.

To achieve the targeted objective has proceeded, first, to achieve the thickening of the lifting geodetic network in order to ensure the number of points required for the detailed topographic and cadastral measurements of the vineyard unit territory [4]. Also, has aimed, based on measurements, the dynamic of changes in the structure of cadastral plots as size, area, category of use, from the 1989 - 2010 period, as a result of Law No. 18/1991, as amended [5].

Among the practical applications of Vineyard Informational System, which was based on the specific methodology of this informational subsystem of agricultural cadastre, we must emphasize some key aspects:

- use of digital cadastral plans and primary technical and qualitative databases stored on IT supports, at the level of cadastral parcel [3];
- management of information on the state of quality of viticultural heritage, operating under the technical requirements of the European Union [7];
- verify ownership of various properties and/or parts of real estates, with agricultural use, noble vineyards, in public or private domain of administrative territorial unit, in order to concession, lease and/or expropriation, as required by law;
- spatial analysis, tracking, visualization, descriptive data and other, in order to make the required documentations for the preparation of various real estate transactions;
- providing specific data necessary for vineyard cadastral evaluation, in order to determine the correct tax liabilities of the owners, required by the competent institutions [6].

To complete the objectives of the research project, monitoring was done between the years 1989 to 2010.

3. The situation of cadastral changes within a vineyard unit limitrophe to the City of Iassy - Case study

The vineyards, belonging to Copou Vineyard of Iassy, were established in the 1968 - 1977 period, based upon an unitary project, on a surface area of a body of 111 ha , located on the Patrici Hill, in the North-West side of the outside of the City of Iassy. Basically, this plantation consisted of vine varieties for production of white wine and, in subsidiary, of red wines [6]. In order to harness the potential of the area from the vicinity of Iassy, has set up a vineyard unit to produce wines with designation of origin, specific to the vineyards of the eastern part and North-East of Romania.

In order to achieve graphical infrastructure of the future Vineyard Informational System it is studied the cartographic framing of the vineyard unit and implemented the location and cadastral determination plan [3]. Thus, resulted the structure by plots of the studied vineyard unit, and by centralizing data was obtained also the plots distribution by use category, being performed their analysis of the distribution by the size of surfaces and average slope of the cadastral plot, information useful in developing the future Informational System [6].

If initially, depending on the conditions of relief was designed and set up a vineyard unit, after the year 1990, the parcels situation, in terms of cadastre, began to change gradually. The causes were various, such as: the previous owners were put in possession according to the

Law No. 18/1991, the plots were dismembered, the plots were included in the inside of the city, the plots were subject of selling transactions through notary, for some plots was changed the category of use, the conditions imposed by Law No. 50/1991 of constructions.

Starting from the cadastral plan from 1989 was studied the evolution of cadastral situation to highlight, based on topographic measurements of 2004, the changes resulted by applying Law No. 18/1991, based on dismemberments registered until 2008 at Cadastre and Land Register Office of Iassy, the effect of including the vineyard unit in the buildable area of Iassy, respectively based on the cadastral data from 2010 of the General technical cadastre, the changes resulted from the application the Law No. 50/1991 of constructions [5].

Based on the three stages of updating cadastral data were obtained following statistical representations:

➢ The evolution of the occupancy percentage of agricultural and non-agricultural lands within the vineyard unit, depending on the area, presented in Table 1.

Table 1. The changes occurring upon agricultural and non-agricultural lands within the vineyard unit

Lands	**Period 1989 – 2010**							
	1989		2004		2008		2010	
	A (ha)	A (%)	A (ha)	A (%)	A (ha)	A (%)	A (ha)	A (%)
agricultural	98.7390	88.9	97.9865	88.2	97.6734	87.9	95.1097	85.6
non-agricultural	12.3194	11.1	13.0719	11.8	13.3850	12.1	15.9487	14.4
TOTAL	**111.0584**	**100.0**	**111.0584**	**100.0**	**111.0584**	**100.0**	**111.0584**	**100.0**

By graphical representation of the area occupied by agricultural and non-agricultural land from the vineyard unit, for each stage of updating the cadastral data, it is observed how after the inclusion of the study area in the inside of the City of Iassy, the area of agricultural land decreased by 2.4 % (2.6 ha) at the expense of non-agricultural land (Fig. 1).

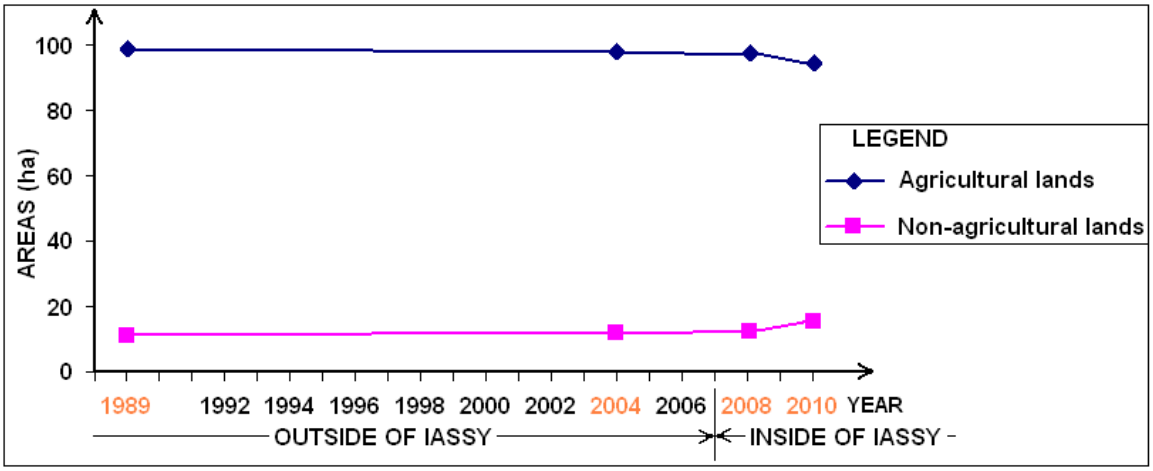

Fig. 1 The dynamics of agricultural and non-agricultural land within the vineyard unit (1989 – 2010)

➢ The evolution of the occupancy percentage of lands by categories and subcategories of use within the vineyard unit, depending on the area, presented in Table 2.

If in the first two stages the vine planting area decreased at the expense of perennial crops and of 10 new established roads, needed to ensure people's access to parcels for which property rights were recognized, based on Law No. 18/1991, after the inclusion of the vineyard unit in the inside of the City of Iassy, the area of vine plantations almost returned at the expense of perennial crops (Table 2 and Fig.2).

Table 2. The changes occurred on land areas by categories and subcategories of use within the vineyard unit

Use category and subcategoria of the land	Period 1989 – 2010							
	1989		2004		2008		2010	
	A (ha)	A (%)	A (ha)	A (%)	A (ha)	A (%)	A (ha)	A (%)
Arable (A)	6.0107	5.4	10.0698	9.1	10.0698	9.1	4.5629	4.1
Pasture (P)	0.6828	0.6	0.6828	0.6	0.6828	0.6	0.7037	0.6
Hay (F)	2.9216	2.6	2.9216	2.6	2.9216	2.6	2.1013	1.9
Noble vine (VN)	88.7598	79.9	83.9482	75.6	83.6351	75.3	87.0417	78.4
Orchard (L)	0.3641	0.4	0.3641	0.4	0.3641	0.4	0.7001	0.6
Forest (PD)	0.8941	0.8	0.8941	0.8	0.8941	0.8	0.3237	0.3
Waters (H)	0.2761	0.2	0.2761	0.2	0.2761	0.2	0.2829	0.3
Roads (D)	9.2241	8.4	9.9766	9.0	10.2897	9.3	10.8191	9.8
Yards constructions (CC)	1.9251	1.7	1.9251	1.7	1.9251	1.7	3.4716	3.1
Green spaces (CP)	-	-	-	-	-	-	0.3524	0.3
Unproductive land (N)	-	-	-	-	-	-	0.6990	0.6
TOTAL	**111.0584**	**100.0**	**111.0584**	**100.0**	**111.0584**	**100.0**	**111.0584**	**100.0**

However, after inclusion, in 2007, of the vineyard unit in the buildable area of the City of Iassy, the surface of the use category courts construction almost doubled, increasing by 1.6 ha, the first three years (Table 2 and Fig .2).

Because initially, when was realized the systematization plan for establishing the vineyard unit, the access paths and service roads had widths between 2.5 m and 4 m, one of the conditions imposed by Law No. 50/1991, updated in 2009, is to ensure in the construction areas access roads with a minimum width of 6 m. This is the main reason that has contributed to increase by another 5.2% (0.5 ha) of road surface (Table 2 and Fig. 2).

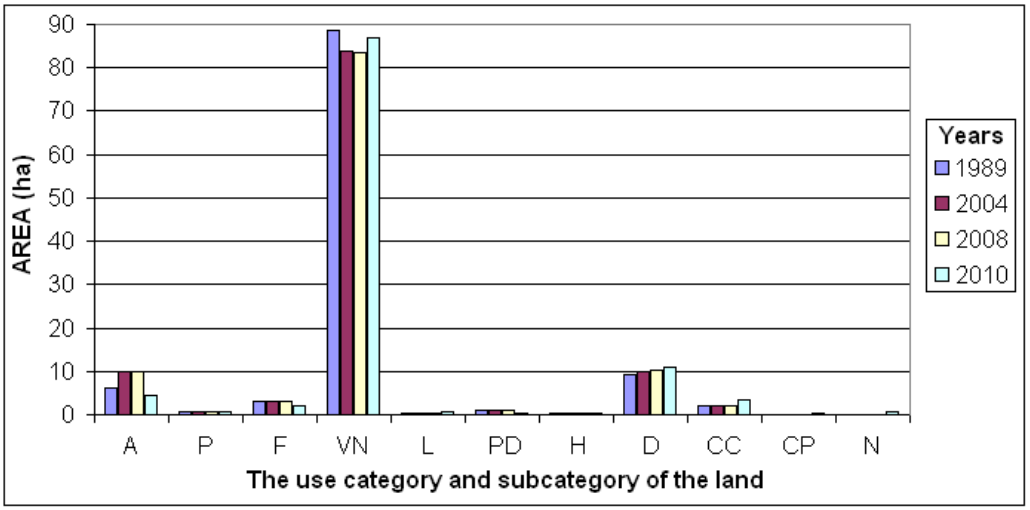

Fig. 2 The dynamics of cadastral plots areas by use category (1989 – 2010)

➢ The evolution of the number of cadastral plots within the vineyard unit, by use categories and subcategories of land, presented in Table 3.

By centralizing data in Table 3 can be distinguished that, in this period of 21 years, the plots number of two of the categories of use (VN and D) greatly increased by dismantling, since the study area was included in the extended inside of the City of Iassy.

Table 3. The changes of the number of cadastral plots of the vineyard unit, by categories and subcategories of use of land (1989 – 2010)

Years	A	P	F	VN	L	PD	H	D	CC	CP	N	**TOTAL**
1989	20	5	7	67	1	4	3	77	8	0	0	**192**
2004	21	5	7	97	1	4	3	126	8	0	0	**272**
2008	21	5	7	209	1	4	3	131	8	0	0	**389**
2010	43	5	14	323	4	4	3	219	33	8	4	**660**

By the graphic representation of the total number of plots, obtained by dismemberment, for each step of updating the cadastral data is observed, as in the last stage, there is a more ascending trend, after inclusion of the vineyard unit in the buildable area of the City of Iassy (Fig. 3). This is because of the owner's interest to dismantle plots in land parcels between 300 - 1000 m and removing them from the agricultural circuit, these operations being required for obtaining building permits. So, in the last two years, these changes have resulted in removing from the agricultural circuit of 26 plots and tabulation of 27 new constructions [5, 7].

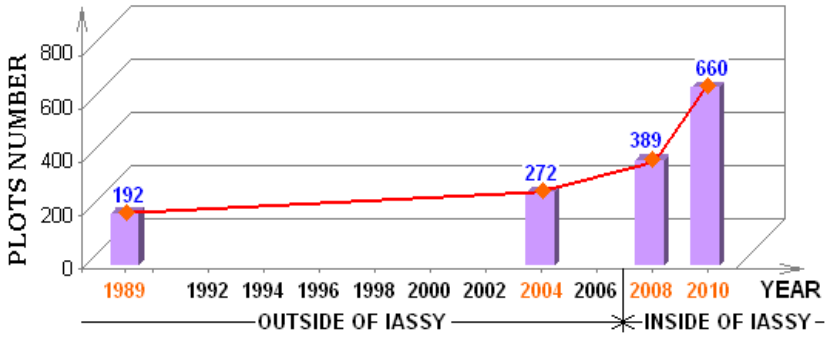

Fig. 3 The evolution of the number of cadastral plots within the vineyard unit (1989 – 2010)

➢ The evolution of ownership mode of cadastral plots within the vineyard unit, presented in Table 4 and Fig. 4.

If initially all cadastral parcels of the vineyard unit were state-owned, after 1990, the situation changed due to subsequently legal effects.. Thus, until 1990, the percentage of ownership of cadastral parcels, was 100% for legal entities, and after 2004 of 16% (18 ha) for legal persons and 84% (95 ha) for individuals [5].

Table 4. The dynamics of ownership mode of cadastral plots within the vineyard unit

Years	Plots in ownership		Plots total	Persons		Persons total	Ownership mode		Ownership mode total
	state	private		physical	legal		Exclusive	Indivisible	
1989	192	-	192	-	1	1	192	-	192
2004	70	202	272	66	1	67	145	127	272
2008	70	319	389	73	4	77	202	169	389
2010	71	589	660	103	5	108	419	241	660

In 2008, in the legal entities category we have: the State Domains Agency, the Iassy City Council, the Vinifruct Copou Company of Iassy, holding 82 cadastral plots, from which 70 plots are state property. Subsequently, the number of legal entities increased by one unit as the Company Vinifruct Copou sells a cadastral plot obtained by dismantling the company VINI COM Iassy. However, in 2010 there were 58 individuals and five legal entities that owned exclusively 419 cadastral plots, respectively 45 individuals, who owned undivided

241 cadastral plots (Table 4). This fact is illustrated also in the graphic representation, which indicates the way of owning the cadastral parcels reported to the four reference years (Fig. 4).

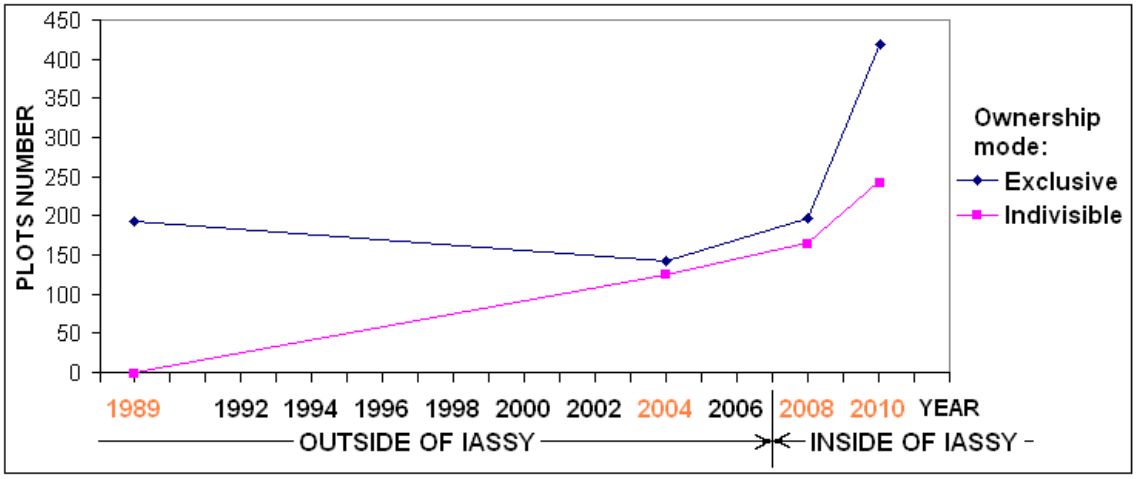

Fig. 4 The evolution of ownership mode of cadastral plots within the vineyard unit (1989 – 2010)

➢ The distribution of agricultural and non-agricultural lands within the vineyard unit, by the category of slope, presented in Table 5 and Fig. 5.

Based on the topographic measurements from the year 2004, the agricultural and non-agricultural area of 7.74 ha (7.0%) it is situated in the relatively flat relief zone, with slopes between 0 - 5%, the area of 42.45 ha (38.2%) in the low hilly relief zone, with slopes between 5.1 -10% and the area of 60.87 ha (54.8%) in the moderately hilly relief zone, with slopes between 10.1 - 25% (Table 5).

Table 5. The distribution of agricultural and non-agricultural lands within the vineyard unit, by the category of slope

Lands	Slope category of land (%)						**Agricultural and non-agricultural total**	
	0.0 – 5.0		5.1 – 10.0		10.1 – 25.0			
	A (ha)	A (%)	A (ha)	A (%)	A (ha)	A (%)	**A (ha)**	**A (%)**
agricultural	7.35	6.6	35.46	31.9	55.18	49.7	**97.99**	**88.2**
non-agricultural	0.39	0.4	6.99	6.3	5.69	5.1	**13.07**	**11.8**
Total	**7.74**	**7.0**	**42.45**	**38.2**	**60.87**	**54.8**	**111.06**	**100.0**

It was adopted, as an anti-erosion measure, at the establishment of the vineyard plantations on moderately hilly land, the plantation of the vine rows parallel to the general direction of the level curves, for applying the plantation maintenance works in the same direction.

Also for resolving various issues, by loading the graphical and textual database on the platform of specialized software, can be achieved the display in different color-coded of the studied areas. If is chosen the association of a color for each category of slope of the land will result the Slopes cartogram [7]. Moreover, in case of queries, one of the parameters must be the time, being important the feature of the plots at some point in time.

Also, from the graphic representation can be observed that the biggest percentage (49.7%) it belongs to the agricultural areas (55.18 ha) situated on moderately hilly terrains, respectively 6.3% the non-agricultural areas (6.99 ha) situated on low hilly terrains (Table 5 and Fig. 5).

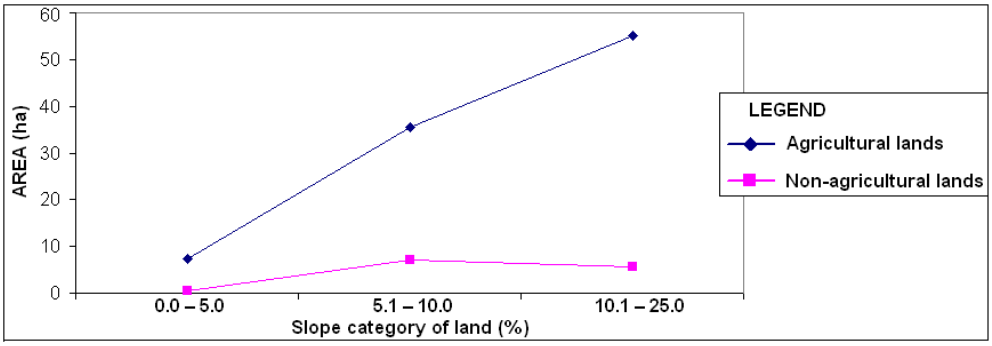

Fig. 5 The distribution of agricultural and non-agricultural lands within the vineyard unit, by the category of slope

➢ The distribution of agricultural and non-agricultural lands within the vineyard unit, by the exhibition towards sunlight, presented in Table 6 and Fig. 6.

The agricultural and non-agricultural lands (Table 6) with shadowed exhibition have North-Northeastern orientation, with semi-shadowed exhibition have East-Northwestern orientation, with sunny exhibition have South-Southwestern orientation and with semi-sunny exhibition have West- Southeastern orientation [6].

Table 6. The distribution of agricultural and non-agricultural lands within the vineyard unit, by the exhibition towards sunlight

Lands	Name of exhibition towards sunlight								**Total**	
	shadowed		half-shadowed		sunny		half-sunny			
	A (ha)	A (%)	A (ha)	A (%)	A (ha)	A (%)	A (ha)	A (%)	**A (ha)**	**A (%)**
agricultural	7.32	6.6	0.15	0.1	54.88	49.4	35.64	32.1	**97.99**	**88.2**
non-agricultural	7.57	6.8	0.17	0.2	3.89	3.5	1.44	1.3	**13.07**	**11.8**
Total	**14.89**	**13.4**	**0.32**	**0.3**	**58.77**	**52.9**	**37.08**	**33.4**	**111.06**	**100.0**

From the graphic representation can be observed that the biggest percentage (49.4%) it belongs to the agricultural areas (54.88 ha) situated on sunny exhibition terrains, respectively 6.8% the non-agricultural areas (7.57 ha) situated on shadowed exhibition terrains (Table 6 and Fig. 6).

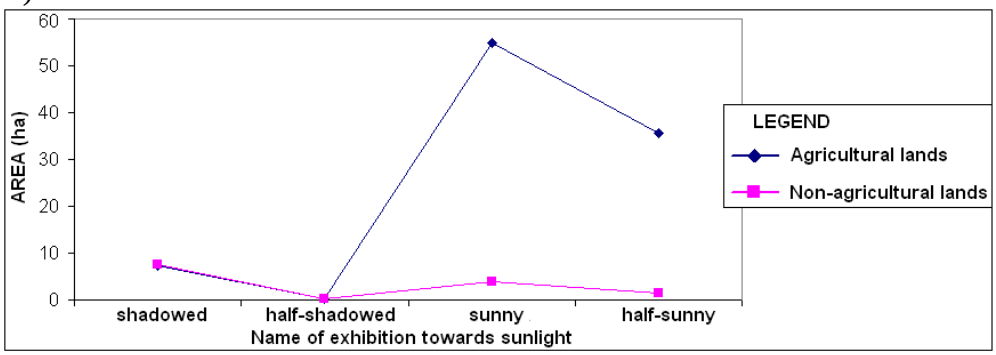

Fig. 6 The distribution of agricultural and non-agricultural lands within the vineyard unit, by the exhibition towards sunlight

Both categories of terrains have the lowest percentage in the case of areas situated on lands with semi-shadowed exhibition (table 6 and Fig. 6).

Only through evidence based on cadastral data from continuously updated information is possible to obtain the Cadastral Informational Systems for clear and accurate statistical representations.

4. Conclusions

The development of cadastral databases of Cadastral Informational Systems, on GIS platform of specialized software, creates benefits in the management, operation and updating records based on information that render the cadastral situation on the field at any time.

The more efficient capitalization, by the user, of basic and specialized data, from cadastral records, by rapidly obtaining the statistical representations, based on real and accurate information gathered on the field, regardless of their volume and complexity.

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