

# **Revitalizing of the cadastre has always depended on state policy**

**Nikola VUČIĆ, Jelena UNGER, Croatia**

**Key words:** cadastre development, cadastral resurvey, land registry, cadastral maps

## **SUMMARY**

The development of the economy, as well as private ownership relations in each country, largely depends on the credibility of cadastral and land registry data. The state of the cadastre has always depended on state policy at both national and local levels. The paper describes the historical development of the cadastre in Croatia and its recent state.

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## 1. INTRODUCTION

After the Second World War, Federated People's Republic of Yugoslavia was created with a new socio-political system. Post-war state policy included implementation of agrarian reforms, nationalization and confiscation. Many changes in ownership relations and the position and shape of cadastral plots in the field were not recorded in the cadastre. This led to a discrepancy between the actual situation in the field and the data recorded in the cadastre and land registry. For a certain period of time the cadastre had an important role in the taxation of citizens, but the observed changes in the field were recorded only in the written part of the cadastre, not in the cadastral maps. The technical, financial and personnel neglect of the cadastre came to the fore.

The Act on Survey and Land Cadastre from 1968 (Official Gazette 39/1968) for the first time prescribed, that conducting of new surveys and recording them in the cadastre is important for the state and that these must be done by state authorities for geodetic works. That regulation was a turning point when it came to relations between the state and the cadastre. But due to the lack of professional geodetic staff, cadastral surveys were much fewer what was really needed. Quality cadastral surveys were carried out in the territory of the Socialist Republic of Croatia in the period from 1950 to 1990, but unfortunately most of them did not become official record of the land registry.

Only with the independence of the Republic of Croatia after 1990, there came a change for the better. An awareness arose that Croatia inherited obsolete, destroyed and outdated cadastral and land registry records and that their development must become one of the priority tasks of the state policy.

A new impetus for the development of these records was felt only in 2003, when the Government introduced a long-term project aimed at arranging land registry and the cadastre. Since then, cadastres have undergone major changes. However, the needs of arranging the cadastre and land registry still exceed the state's financial capabilities. That is the reason in 2021 that the Government of the Republic of Croatia decided to concentrate on arranging the most valuable land in the Republic of Croatia and proposed to the Parliament the adoption of a multi-year program of cadastral surveys of construction areas for the period 2021 - 2030. The Parliament has adopted this program and the implementation of the program is ongoing. This kind of support from the state will surely lead to completely up-to-date and harmonised cadastral and land registry records in construction areas, and thus the development of the economy and the country as a whole.

## 2. LAND ADMINISTRATION IN CROATIA

Spatial data and data on real property in Croatia are managed in multiple registers with lot of end users. Basic registers are the Cadastre and Land registry. The Cadastre maintains data on the position, shape, and area of real properties, while the Land registry maintains data on rights, restrictions, and responsibilities. Responsible institutions of public authority are the State Geodetic Administration (for the Cadastre) and municipal courts as a parts of Ministry of Justice (for the Land registry). In cadastral offices (20 regional cadastral offices as well as the Municipal Office for Cadastre and Geodetic Works of the City of Zagreb), real properties are registered based on their technical characteristics. The cadastral data on real properties (cadastral parcels) are the basis for the establishment, renewal, storage, and maintenance of land registry that are kept across 109 land registry offices. In Land registry, the data on cadastral parcel title holders are associated with the data on cadastral parcels defined by the cadastre. Real property in Croatian real property law is based on the *superficies solo cedit* principle, where a land surface parcel includes everything relatively permanently associated with the parcel on or below the land surface (primarily buildings, houses, etc.). A real property (LA\_BAUnit in ISO 19152), in Croatian legislation, may consist of one or more land parcels registered in the Land registry in the same property sheet, hence they are legally combined in a single body (registered land unit). Grass, trees, fruits, and all valuable commodities provided on the surface of the land are parts of this real property until the land is divided (Vučić et al. 2017).

In December 2018 the new Law on State Survey and Real Property Cadastre (Official Gazette 112/2018, 39/2022) was brought into the force and introduced several changes in Croatian geodetic profession. The law introduced the Register of Buildings as a transitional register towards 3D cadastre, combining datasets from several existing sources and newly collected datasets. The scope of Register of Geographical Names and Register of Spatial units have been redefined. The Cadastre of Infrastructure (Utility line Cadastre) was returned under the jurisdiction of the State Geodetic Administration because previously it was under the jurisdiction of local government units. The process of cadastral resurveys has been redefined. Also this law regulates improved surveying methodology in the Republic of Croatia - this time each technical ordinance contains technical specifications that define the procedure in more detail (Vučić et al. 2022).

## 3. HISTORICAL REVIEW OF CROATIAN CADASTRE

Cadastral maps on the territory of the Republic of Croatia originate from different time periods.

### 3.1 Period before World War II

First employable cadastral maps, most of which are in scale 1:2880, arise with proclamation of the Imperial Patent in 1817 and preparation of the land cadastre in Croatia region under Austria-Hungary.

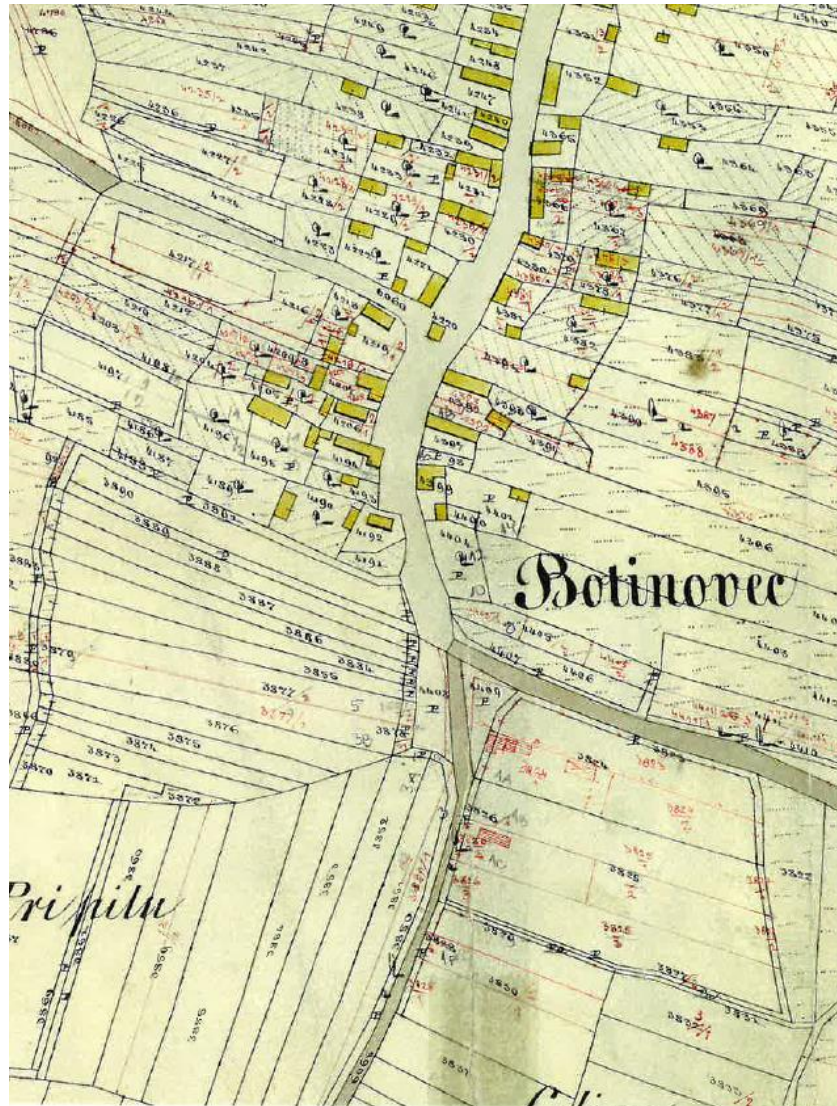


Figure 1. Old cadastral map, scale 1:2880 - cadastral municipality Kunovec

Seven coordinate systems with different starting points had to be used as surveys were performed without projection in plane rectangular system (Borčić and Frančula, 1969). Instructions for cadastral surveying (Katastral-Vermessungs-Instruktion) with appended legends and topographic keys (ZeichenErklaerung) defined basics of sketch representation of cadastral data in 1820. Few labels and some colours were used to mark building units. Changes and data updates of the cadastral map according to Cadastre Maintenance Law from 1883 were executed by crossing out old and colouring new condition in red, causing clutter and illegibility leading to systematic upgrade at the beginning of the 20<sup>th</sup> century in the Royal Lithographic Office in Vienna. This old cadastral maps are still in use on around 70 % percent of Croatian territory, but in digital vector form (Roić et al. 2005). Above is an example of a cadastral map

from 1859 for the cadastral municipality Kunovec in Koprivničko-križevačka county. (Figure 1).

Kingdom of Yugoslavia introduced the Gauss-Krüger projection with maps prepared in scales 1:500, 1:1000, 1:2000, and 1:2500.

### **3.2. Period from 1947 till 1991**

After the Second World War, in 1947, in the new Federative People's Republic of Yugoslavia, the Geodetic Administration under the Government of the People's Republic of Croatia was established to carry out the tasks of the geodetic service in the area of the People's Republic of Croatia, based on the General Law on People's Committees and cadastre offices are established in all administrative municipalities of People's Republic of Croatia. It is rare to find a graduate engineer in geodesy in cadastres. The measures of the state's post-war policy, which were hurriedly implemented in this period (such as agrarian reform, nationalization, confiscation and colonization), were difficult to follow by the implementation of new conditions in the cadastre, so there was a large discrepancy between the data entered in the cadastral register and the situation on the ground. Given that at the same time cadastral data played a key role in the taxation of agricultural production, such a situation was unacceptable. A massive determination of possessions and culture was undertaken on the ground, and the data of the operation was presented on the spot and in several settlements in parallel.

With the adoption of the Constitution of the Socialist Federal Republic of Yugoslavia (SFRJ) from 1963 the name of the state and its republics is changed and the territory of the republics is divided into municipalities and communities of municipalities. In order to carry out the function of the social community in terms of land management and use, land surveying and cadastre offices are established in municipalities. The most important tasks performed in the Institute are still audits of cadastral operations without field measurements.

Changes in the priorities of performing tasks in the cadastre come with the adoption of the Law on Land Survey and Cadastre. The law defines that the land survey and cadastre, as well as their maintenance, are of interest to the entire country and that these works have to be performed by the bodies responsible for geodetic work as well as the work organizations established to perform these activities. Funds are provided by the Republic based on medium-term and annual programs adopted by the Republic Geodetic Administration. On the basis of this Act, cadastral surveys were initiated where there had been a significant discrepancy between the data entered in the cadastral register and the situation on the ground, which could not be removed by regular maintenance. Such cases mostly occurred in urban areas due to large-scale industrialization, settlement and construction.

At that time, the cadastre also performed geodetic services for the needs of many other services and citizens, and it was also obliged to eliminate all identified deficiencies on plans, maps and in the written part of cadastre.

The new Constitution of the Republic of Croatia from 1974 (Official Gazzete 1974) brought significant changes related to ownership. Ownership binds, and holders of ownership rights and



their users are obliged to contribute to the common good in such a way as to legally resolve their ownership relationship, that is, to accurately record their real estate in terms of the position, shape and area of cadastral parcels, as well as ownership, use or possession. The Law on Geodetic Survey and Land Cadastre (Official Gazette 1974a) and many new regulations derived from that Law enabled the quality performance of the aforementioned works.

Technical purpose of the cadastral system during the Socialist Republic of Croatia (1963-1991) demanded preparation of the topographical and cadastral maps and introduction of the new real world features. Below is an example of a cadastral map from 1971 for the cadastral municipality Koprivnica in Koprivničko-križevačka county (Figure 2). Bylaw of Cartographic Signs and Collection of Cartographic Signs defined content of these maps in 1976. Collection defined 346 labels classified in different categories defining sketches as dependent on scale (Roić et al., 2005).

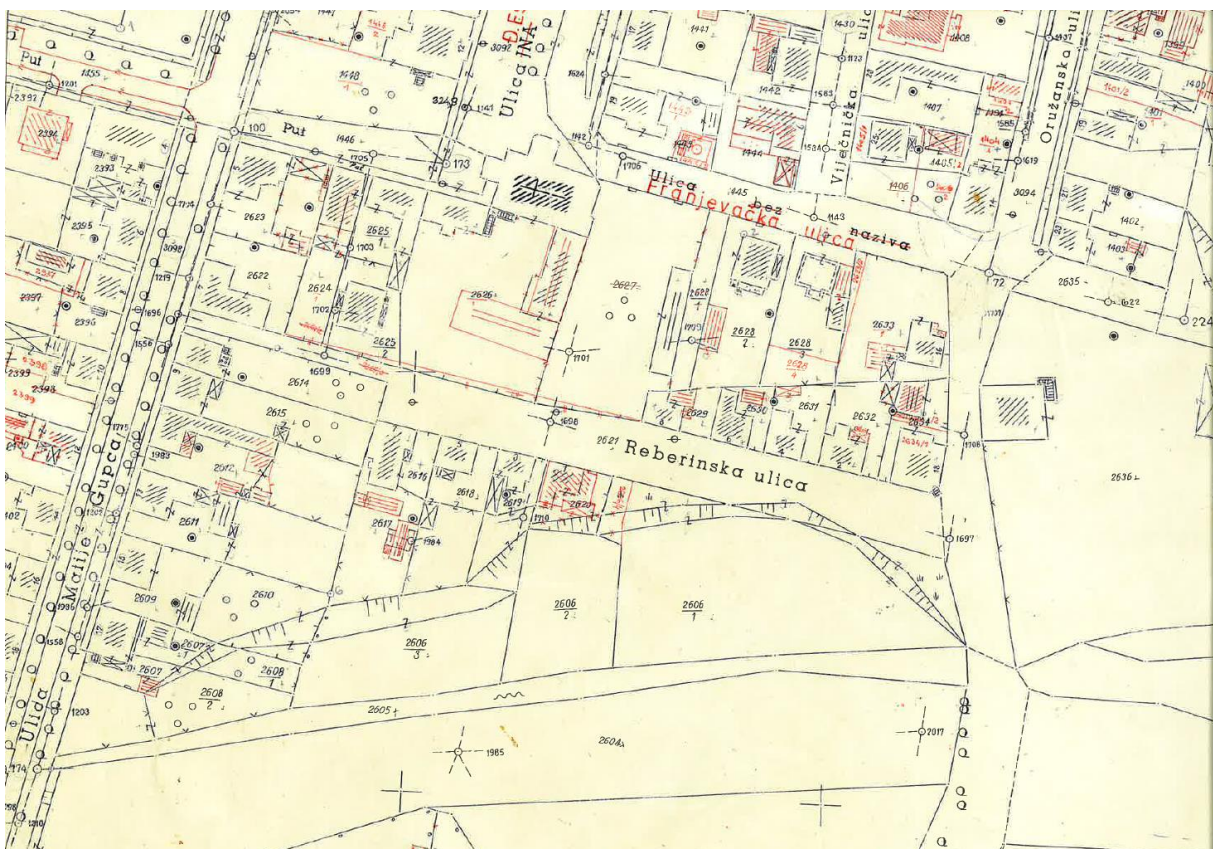


Figure 2. Cadastral map, scale 1:1000 - cadastral municipality Koprivnica

### 3.3. The period from the independence of the Republic of Croatia

After the independence of the Republic of Croatia (that occurred in 1991), major political changes took place and there was a territorial reorganization of local self-government. Due to

the events of the war, immigration and economic developments, real estate transactions increased, and as a result, numerous reports of changes in the cadastre and land registry. The Government of the Republic of Croatia has recognized the importance of the cadastre, but despite this, the reorganization of the cadastre and the reduction of the number of employees were taking place in local communities, without taking into account the increase in the volume of work. Personnel problems in the cadastre were also brought by the Act on independent performance of economic activities by personal labour (Official Gazette 19/1990), which established the conditions for independent performance of economic activities by personal labour and with assets owned by citizens, and many experts from the cadastre go to the private sector. Despite the lack of understanding of the needs of the cadastre, during that period, cadastral records are updated and improved due to the considerable public awareness of the importance of accurate cadastral data and the need to carry out cadastral surveys, whether it was individual geodetic reports funded by owners or surveys of entire cadastral municipalities which were co-financed from both state and local governments.

Until the year 2000, the cadastre was part of the local self-governing communities, and the work and development of the cadastre was decided in these communities, headed by politicians. Often, although aware of the fact that cadastral data is needed in all branches of the economy, they did not decide on projects that would significantly contribute to its development. First of all, because of the technical and financial demands of such projects. Short-term measures were taken that did not completely solve the problem of cadastre neglect. Pursuant to the Law on State Survey and Real Estate Cadastre from 1999 [Official Gazette 128/99], from 1.5.2000, cadastrals become part of the State Geodetic Administration (SGA) as Regional Cadastre Offices. The scope of own activity is significantly reduced (at the request of the parties, only geodetic studies are provided for the purpose of implementing a change in land use) and cadastral income for taxation of agricultural production is no longer maintained. The emphasis is on improving cadastral data. The implementation of projects that contribute to the development of the cadastre continued on the basis of the State Survey and Real Property Cadastre Program for the period 2001-2005. (Official Gazette 2001), and one of the most important tasks from the Program is the implementation of cadastral surveys for the purpose of establishing the real estate cadastre and renewing the land registry.

According to the program, a significant part of the funds for carrying out cadastral surveys should have been provided by Local Self-government Units, where the atmosphere had not changed until then - they were only interested in short-term projects that get immediate results. It was necessary to build a relationship imbued with mutual trust, which was really not easy in the beginning. All the heads of cadastrals (of which there are 21 branch offices in the Republic of Croatia), had to communicate a lot with the future participants of the program. First of all, to inform them about what it is all about, to convince them of the benefit they get from the implementation of the program, to remind them of the current unsatisfactory state of cadastral data that they use every day in their business. It really showed which leaders are more skilled in persuasion because a larger number of cadastral surveys were initiated there. Later, when the first results of the program appeared and the value obtained from its implementation was evident, it was easier to achieve mutual trust and secure funds. The development of technology

and the transparency of data have a great influence on the realization of the program, but personal contacts remained the most important for the success of every project.

The project of arranging land registry and cadastre started in 2003, apart from cadastral measurements, brings other new challenges for the cadastre, such as the translation of cadastral plans into digital form (Digital Cadastral Map - DCM). The resulting DCM was compared with the written part of the cadastral record. All observed mistakes and errors, which could be corrected based on the available documentation in the cadastre or Land registry, were corrected, and the correction of other errors, for which it was necessary to carry out field measurements, continued.

Law on State Survey and Real Estate Cadastre which entered into force on February 17<sup>th</sup>, 2007 did not bring significant changes in the structure and scope of cadastre work, but SGA programs, adopted after this Act, greatly increase the scope of work performed in it, especially those that can be performed exclusively by officers of the geodetic profession. Today, cadastral plans are homogenized and borders between cadastral municipalities are regulated.

#### **4. TODAY'S REVITALIZING OF CADASTRE**

The State Geodetic Administration, together with the Ministry of Justice and Public Administration, implements numerous projects for improvement of land administration. The current Law on State Survey and Real Property Cadastre (Official Gazette 118/2018, 39/2022) introduced the real property cadastre as a reliable and high quality product. Cadastral parcels which are registered in a real property cadastre were measured accurately, by aligning the actual situation in reality with cadastre and land registry. Real property cadastre guarantees real property security. The cadastral parcel registered in the real property cadastre guarantees the same protection of trust such as land registry data. One of the biggest novelties in abovementioned new law is the obligation that quality of field measurement data for boundaries of cadastral parcels and buildings must be determined by the level of confidence for horizontal coordinates with 95% probability standard positional accuracy up to 0.1 meter (Official Gazette 2018). The cadastral map producing in new cadastral survey (Figure 3) are made in conditions of this abovementioned law.





Figure 3. Cadastral map of real property cadastre, scale 1:1000 - cadastral municipality Blace-Trn (source: <https://oss.uredjenazemlja.hr/#/>)

#### 4.1. Cadastral Surveys for the Real Property Cadastre

The cadastral documentation for the Real Property Cadastre is made on the basis of the data gathered and processed through cadastral surveys, the data gathered during the public display of the cadastral survey report (hereon: public display) and the data transferred from the established or renewed Land registry. The public display is carried out by a State Geodetic Administration commission appointed by the Director General at the same time and in connection with the establishment or the renewal of Land registry. During the public inspection process, persons shown as the real property title holders in the cadastral survey report will confirm in writing that they were shown the cadastral survey data and that they agree with the state of the gathered data. A registry of complaints is kept during the public display. Field inspections are compulsory upon the receipt of a complaint. If it is necessary on the basis of the carried out field inspections to change the data contained in the cadastral survey, the changed data will be on public display again. Unfounded complaints will be rejected through a decision passed in an administrative process. Appeals are allowed against a decision to reject a complaint. After the State Geodetic Administration commission has conducted a public display of all cadastral parcels, and the land registry office commission of the municipal court has compiled all land registry units for a cadastral municipality, a Land registry is opened through a decision passed by the Minister of Justice, and with the opening of the Land registry, a correction procedure is opened according to the Land Registration Act. On the day the Land registry is opened, the new cadastral data (new cadastral documentation) is put in official use, on the basis of the decision passed by the State Geodetic Administration Director-General, and the old data is no longer in use (Vučić and Šantek 2018).

Today, both the local self-government and citizens are very interested in the implementation of the cadastral survey program. The highest quality cooperation takes place in the procedures for presenting the data collected by the survey for public display. Local self-government provides spatial and technical conditions for the work of cadastral and land registry commissions. In the beginning, the citizens' response to the presentations was not satisfactory, but soon they realized the importance and benefits of such programs, and today the relationship between the citizens and the commission is very solid. Especially since these procedures mostly took place on their territory and they do not need to go to institutions in distant cities. Citizens saw the practicalities and savings in regulating ownership relations and arranging land in cadastral survey procedures. Through regular cadastral and land registry procedures, they have to allocate much more time and financial resources for the same thing.

Currently the State geodetic administration works on the improvement of the procedures of cadastral surveys together with the Ministry of justice and public administration. On the side of legal aspects the possibility of engagement of a public notary was introduced into the procedure when the municipal court is overloaded. On the cadastral side, amendments to the Law on state survey and real property cadastre are proposed. This amendments will speed up and improve the cadastral resurvey procedures (URL 1).

#### **4.2 Multi-Year Program for Cadastral Surveys of Construction Areas**

Multi-year program for cadastral surveys of construction areas for the period 2021-2030 was adopted by the Croatian Parliament on October 1, 2021 (Official Gazette 2021). Government of the Republic of Croatia adopted the Annual Program of Cadastral Surveys of Building Areas for 2022 on June 3, 2022. Establishment of the cadastral operation of the real estate cadastre and renewal, i.e. establishment of Land registry based on cadastral surveys for real estate in construction areas in the Republic of Croatia. Activities from the Program will be carried out for ten years in the period from 2021 to 2030, and this is considered the largest project of harmonizing cadastres and land registry in the history of the Croatian state. The main activity of the Program is the renewal of the cadastre and land registry for 600.000 hectares of land and real estate in construction areas, areas around construction areas and other areas in the Republic of Croatia that are important for the development of cities and municipalities, counties and the country. Part of the program is also a media campaign which is currently in full swing. The campaign is carried out through radio, newspapers, Internet portals and through billboards and advertisements in villages and towns. A special website related to the multi-year program has also been created. All important activities related to the program are highlighted on that website (Figure 4).

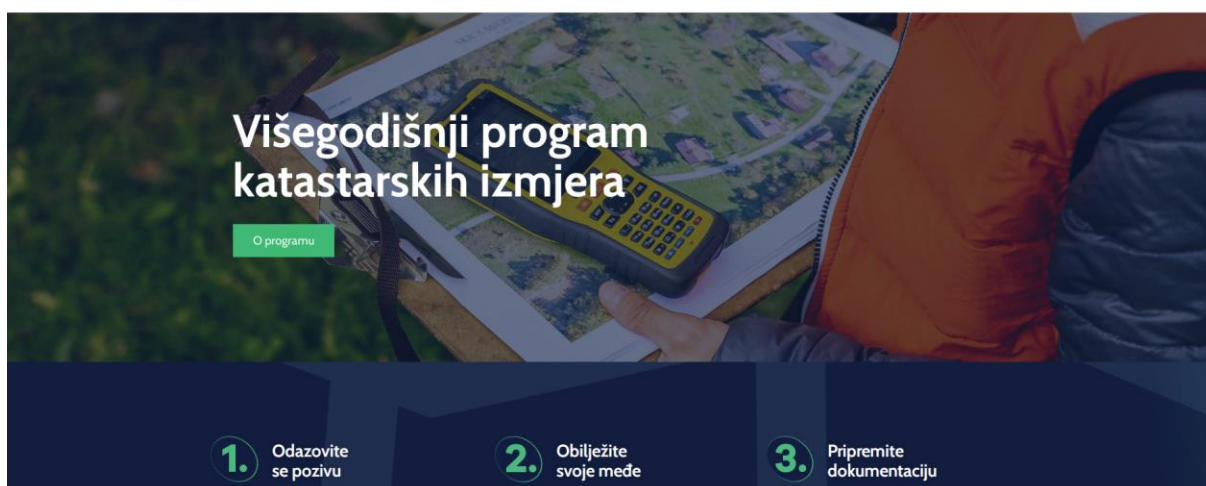


Figure 4. Website of Multi-year program for cadastral surveys of construction areas for the period 2021-2030

By implementing activities from this Program, the state can expect a return on invested funds through a whole series of positive effects; strengthening the competitiveness of the economy, improvement of the business environment, investment growth, improving the management and disposal of state assets, improvement of public administration, improving the efficiency of the justice system (URL 1).

## 5. CONCLUSION

After more than two centuries since the establishment of the cadastre on the territory of the Republic of Croatia, today we can conclude that both the cadastre and land registry have received the attention of the state that they need and deserve. Without the support of the state, the situation in these basic spatial registers cannot be improved. Today, these registers are in a much better condition and all the data is transparent (publicly available on the Internet from 0 – 24 h, 365 days per year), but there is still space for improvement. The program of surveying construction areas, which was adopted for a ten-year period, is being successfully implemented, which proved that the state fully understands and supports the need to arrange the cadastre and land registry.

The implementation of activities from the multi-year program of cadastral surveys of construction areas for the period 2021-2030 will provide up-to-date data on real property in construction areas in the Republic of Croatia and areas around construction areas that are important for the development of cities and municipalities, counties and the whole country. Distribution of real estate data through online services will enable citizens, public and private sector access to real-time data, but also contribute to the development of entrepreneurship and public administration that will use real estate data available digitally. This activities will provide fit for purpose Land Administration and social, economic and economic activities related to it.

Given the state of cadastre and land registry records, it is essential to create new ones because in certain areas these records are in a state that certainly needs to be improved, and a new cadastral survey has proven to be the best solution in the case of the Republic of Croatia.

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URL 2: <https://www.visegodisnjiprogram.dgu.hr/> date access 5<sup>th</sup> January 2024

## BIOGRAPHICAL NOTES

**Nikola Vučić** graduated in geodesy from the University of Zagreb, Faculty of Geodesy. In 2015, he received a PhD from the University of Zagreb for the thesis “Support the Transition from 2D to 3D Cadastre in the Republic of Croatia”. He was employed at the cadastral office in Glina from 1999 to 2004. He was the Head of the Department for Administrative and Professional Supervision at the State Geodetic Administration of the Republic of Croatia. He was the Head of Sector for Cadastral Programs and Special Registers at the State Geodetic Administration of the Republic of Croatia. He was the Head of Division for Special Registers at the State Geodetic Administration of the Republic of Croatia. He was the Head of Sector for cadastral surveys and infrastructure at the State Geodetic Administration of the Republic of Croatia. Currently he is the senior advisor – specialist at the State Geodetic Administration of the Republic of Croatia. His main research interests are land administration systems, 3D cadastres and geoinformatics. He is a member of the Croatian Geodetic Society and the Croatian Chamber of Chartered Geodetic Engineers.

**Jelena Unger** graduated in geodesy from the University of Zagreb, Faculty of Geodesy. She was employed at the surveying division of food factory Podravka. From 1990 to 1995, she was employed at the Koprivnica-Križevci County, cadastral office Koprivnica, as a cadastral officer. From 1995 to 2000, she was employed at the Koprivnica-Križevci County, cadastral office Koprivnica, as the Head of office. Since 2000, she has been employed in State Geodetic Administration as the Head of the Regional Cadastral Office in Koprivnica. Her main interests are land administration systems, improvement of cadastral data and geoinformatics.

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