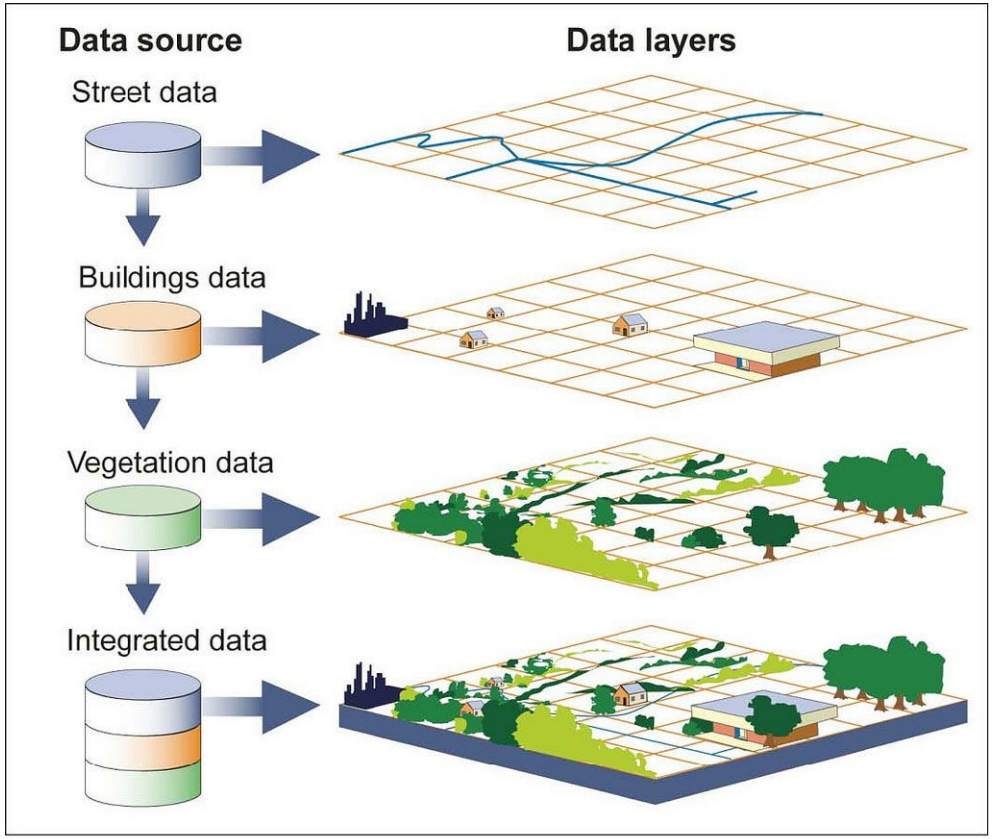
GIS for local governments. The need for a GIS for local governments

1. **General information about GIS**

Data about everything around us require a spatial context for a correct interpretation. Modern computer-based GIS have the ability to develop, analyze, and interpret multiple levels of spatial data.

GIS integrates many types of data. It analyzes the spatial location and organizes layers of information, which can be viewed using 3D or thematic maps. With this unique capability, GIS reveals more in-depth information about data, such as different types of patterns, relationships, or situations, helping users make smarter decisions. Indeed, today, GIS is a very powerful decision-making tool that has a massive range of applications, regardless of scope - resource management, logistics, planning, transportation, demographic, epidemiologic and the environment studies, to name only a few. Also, with the help of GIS, topographic, environmental, demographic, and land use data can be analyzed for a more efficient decision-making process for local authorities, state or private environment.



Source: GAO.

2. The current situation

At present, local governments, and especially rural ones, have not accessed GIS programs for the computerization (digitization) of information. Or, even if they have accessed, they are usually focused on a single specialty: the agricultural register, urban planning, the collection of taxes and fees, municipal networks, etc.

The database from the agricultural register is not linked to the database from the urbanism, nor to the one from the tax office. Each database is independent and does not take into account any changes that would have an impact on another database.

The employees of a local administration usually do not have training in the field of informatics and for this reason they do not have the technical capacity to verify an application offered by a specialized company. Thus, often those who provide such services, in the end offer only one program, without any useful information in that program. In this case, there is the application, but it cannot be used due to the lack of information (attributes) that someone should collect and enter in the database. The computerization of the town hall is ticked, but the local administration cannot use the information.

3. What is proposed

The spatial component

The National Agency for Cadastre and Land Book Registration has started an extensive program for the implementation of the systematic cadastre on two components: on the entire ATU and on cadastral sectors.

ATUs that have been included in the cadastral program over the entire area have a great advantage at this time. Each immobile was measured and the owner (owner or possessor) was identified. For each immobile there is a .cgxml file that contains all the information (attributes) that describe the immobile from a cadastral point of view (owner, area, perimeter, neighbors, category of use, urban - extra-urban, deed of ownership, etc.). There is information that can form the basis of a database that can be completed, so that for each immoblet o be also added other strictly necessary information, both to the local administration and to the citizen. Also, the county and central administrations can extract data from the GIS that the town halls can develop.

The textual component.

The information is collected directly from each owner, with verification and confirmation when displayed.

The importance of the systematic cadastre as a basis for a complex GIS of the local administration consists in the fact that the data initially entered were verified by the mayor's staff and validated by signature and stamp. The same data were verified by the County Office of Cadastre and Land Book Registration, which also validated the work. Following these two validations, the paper was displayed by the mayor's office in a public place and the citizens checked whether the data entered and published correspond to the reality on the ground. Those who found inconsistencies have been able to file appeals to remedy the problems.

modules

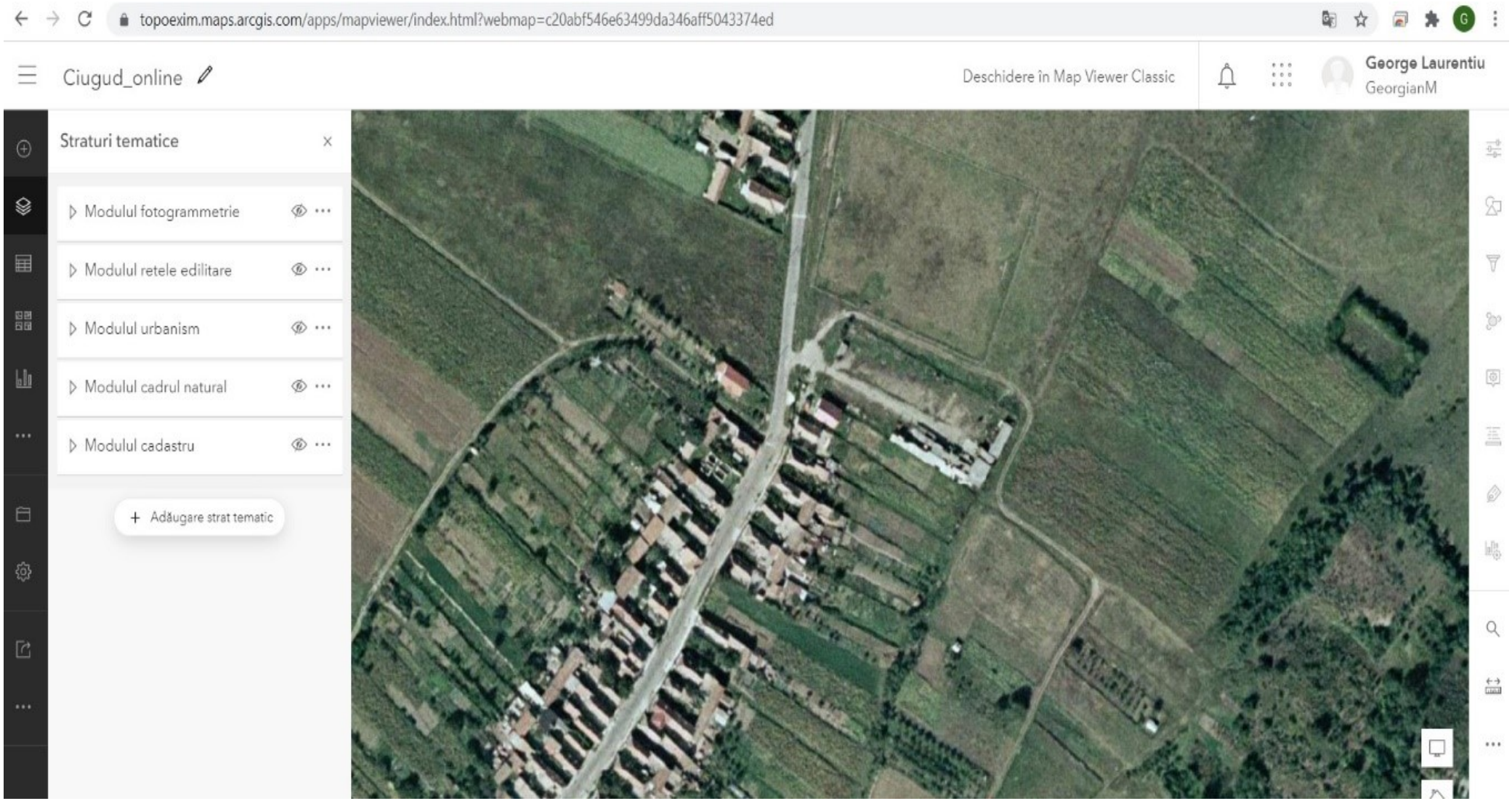


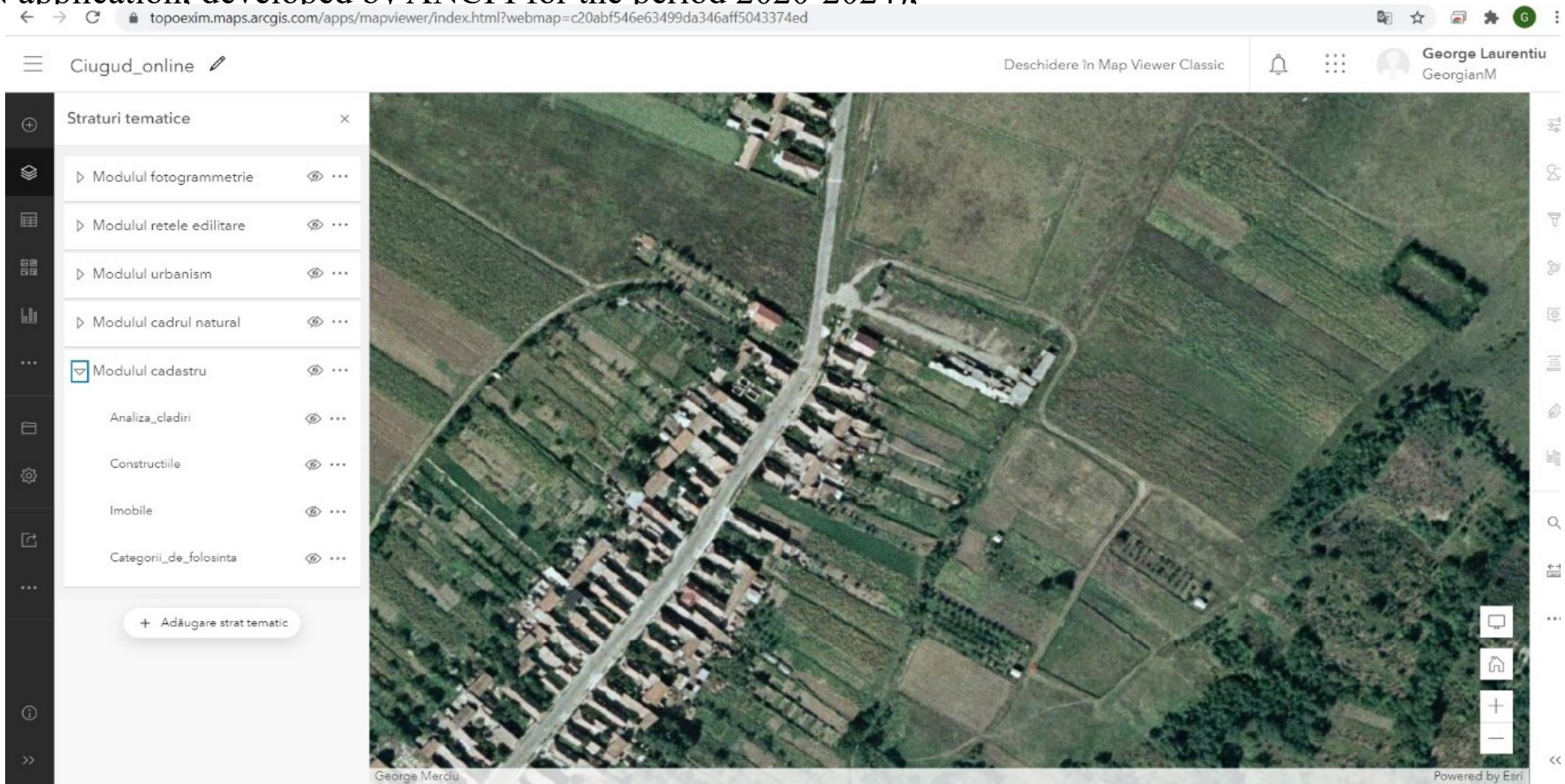
Photo 1 - Arranging the modules within the application

4. The "ParcelMapping GIS" application is structured on 7 modules, with the following description:
4.1. Cadastre module

which contains information about real estates and constructions taken from: Systematic Cadastre, Systematic Cadastre made by cadastral sectors, Sporadic Cadastre E-TERRA 3; the latest version of the .CGXML file is required.

- queries can be made on existing information (e.g. searches by owner name, owner type, a certain category of use, etc.)

- elements for completing the Agricultural Register (specific data that can be extracted from the systematic cadastre and made available to the local administration, which will be able to enter them later in the National Agricultural Register through the dedicated RAN application, developed by ANCPI for the period 2020-2024);



4.1. Cadastre module

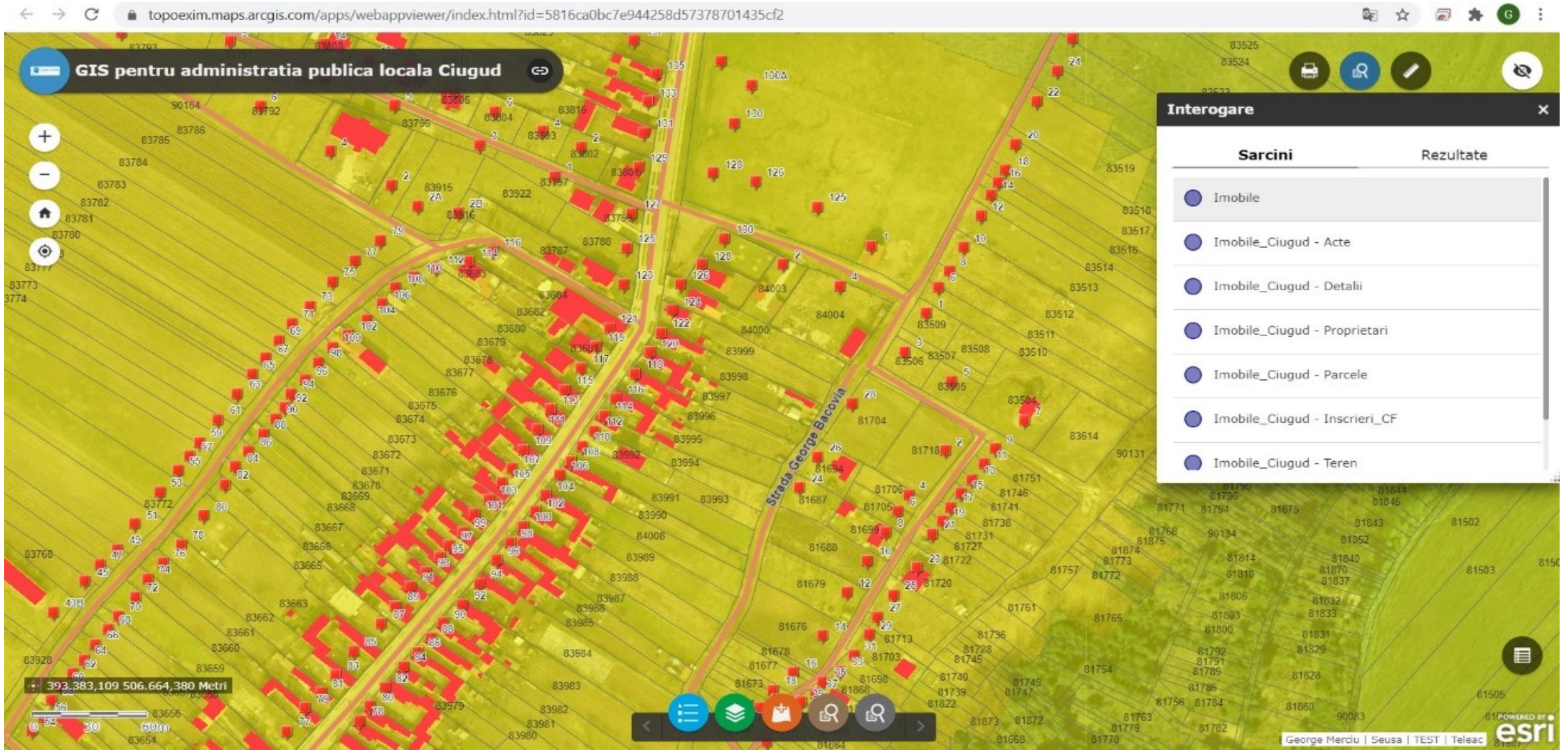


Photo 3 - Cadastre module: possibilities to view the data entered in the Land Book (property deeds, owner, area, etc.). possibilities to search for a property by cadastral number, owner name, personal numerical code, category of use).

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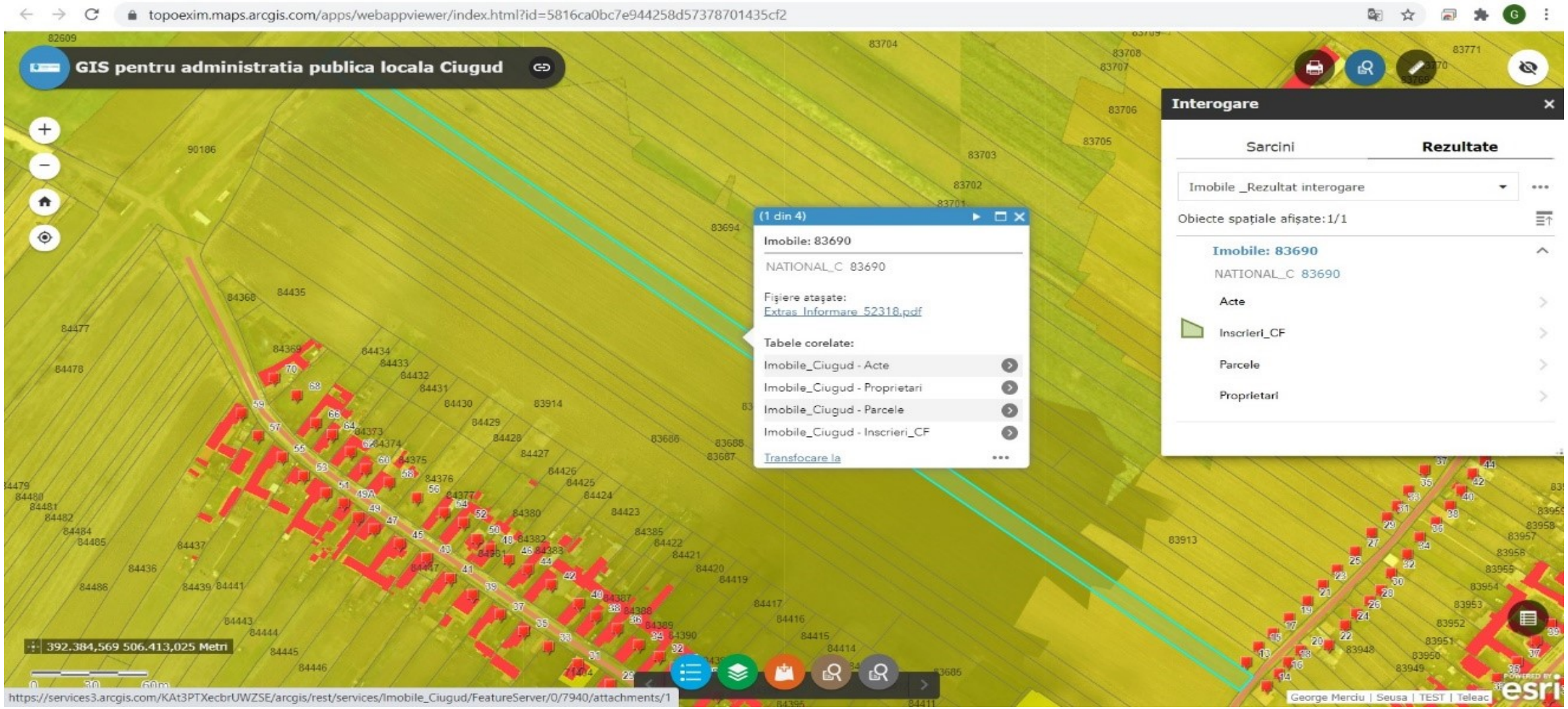

Photo 4 - Cadastre module: results obtained (Land Book extract, cadastral number, owner, category of use, tasks - mortgages, area, etc.)

4.2. The urbanism module

- which contains the local Urban Regulation:

-urban :

- existing urban limit

- functional areas and subareas

- provisions at the level of functional areas in the urban area (e.g.: individual living area, central area, historical monument complexes, areas with building restrictions, etc.)

- extra-urban:

- provisions at the level of functional areas in extra-urban (e.g. watercourse area, agricultural land area, forested land area, the area of land occupied by pastures and hayfields, etc.)

- territorial reference units (TRUs)

- delimitation of villages

- street network, railways

- toponymy of the place

- points of interest (churches, schools, monuments, libraries, railway stations, guest houses, natural reserves, etc.)

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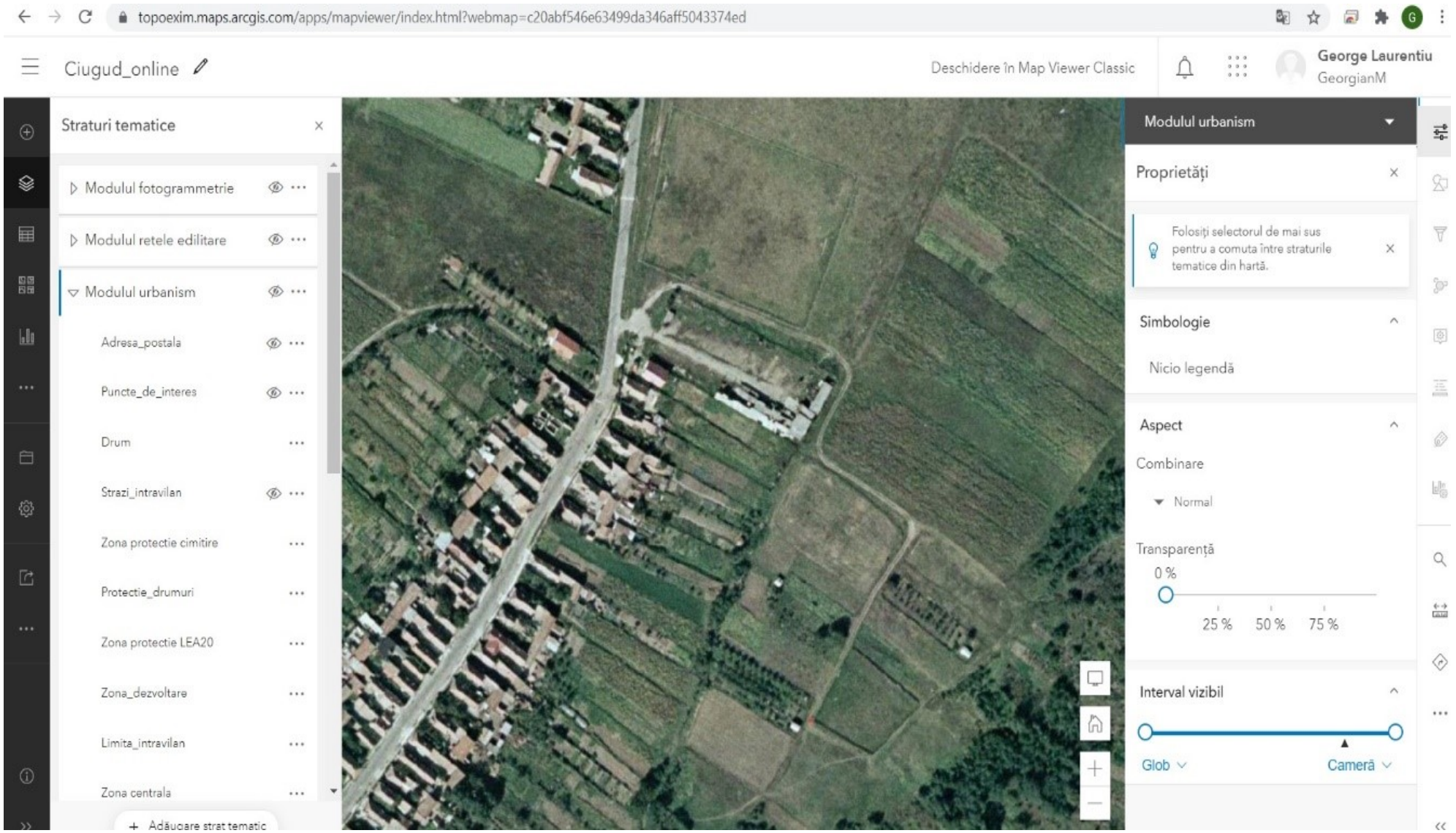

Photo 5 - Urbanism module: urban limit according to the General Urban Plan, protection areas, points of interest, etc.

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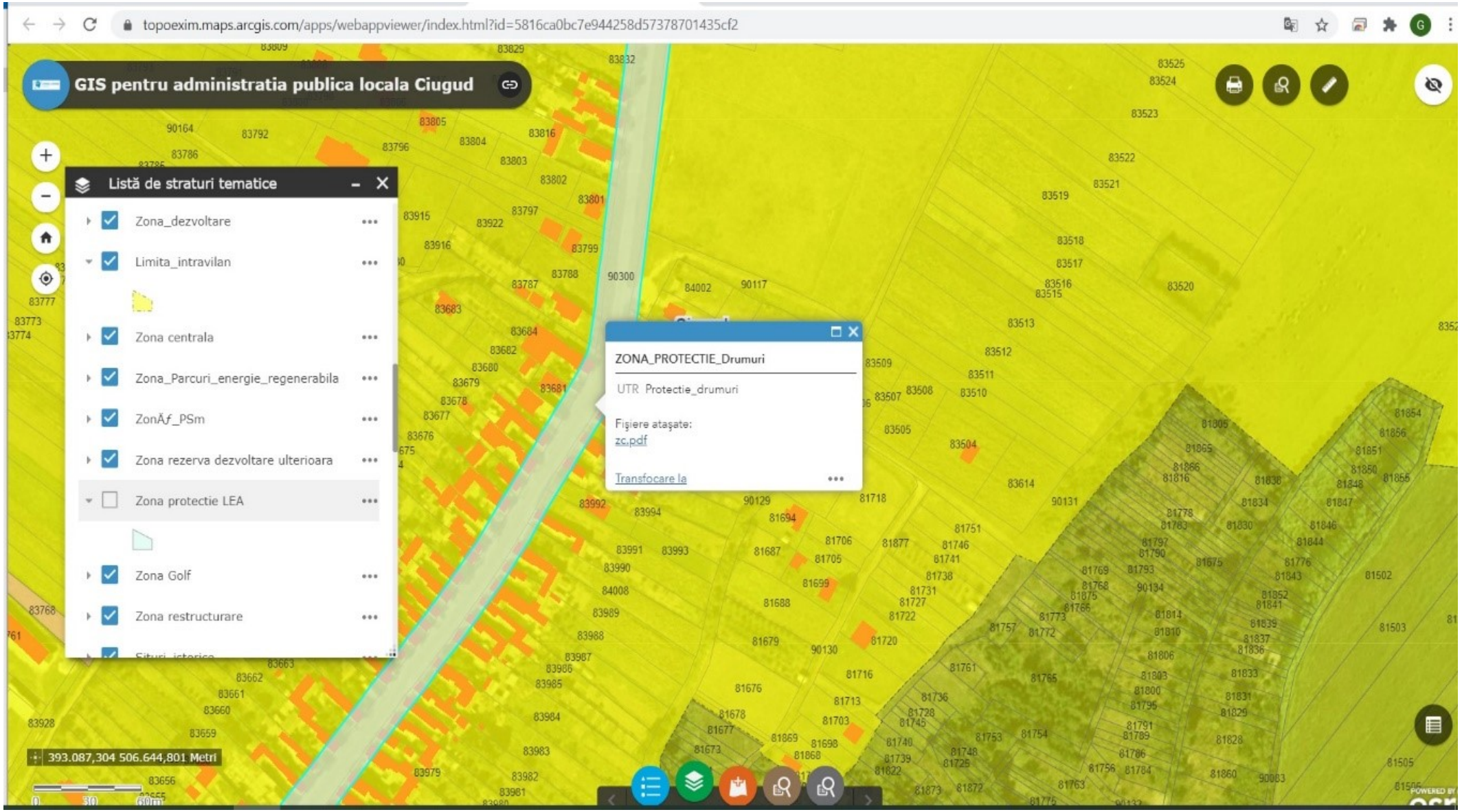

Photo 6 - Urbanism module: road protection area

4.3. Photogrammetry module

4.3.1 orthophotoplan scale 1:5000 for the extra-urban area. Digital terrain model scale 1:5000. Representation of relief by 1:5000 scale level curves.

4.3.2 orthophotoplan obtained from drone flight, for the urban area with a maximum pixel of 5 cm.

- the digital model of the terrain - the mathematical representation of objects in space, such as constructions, infrastructure elements.
- level curves, points, elevations

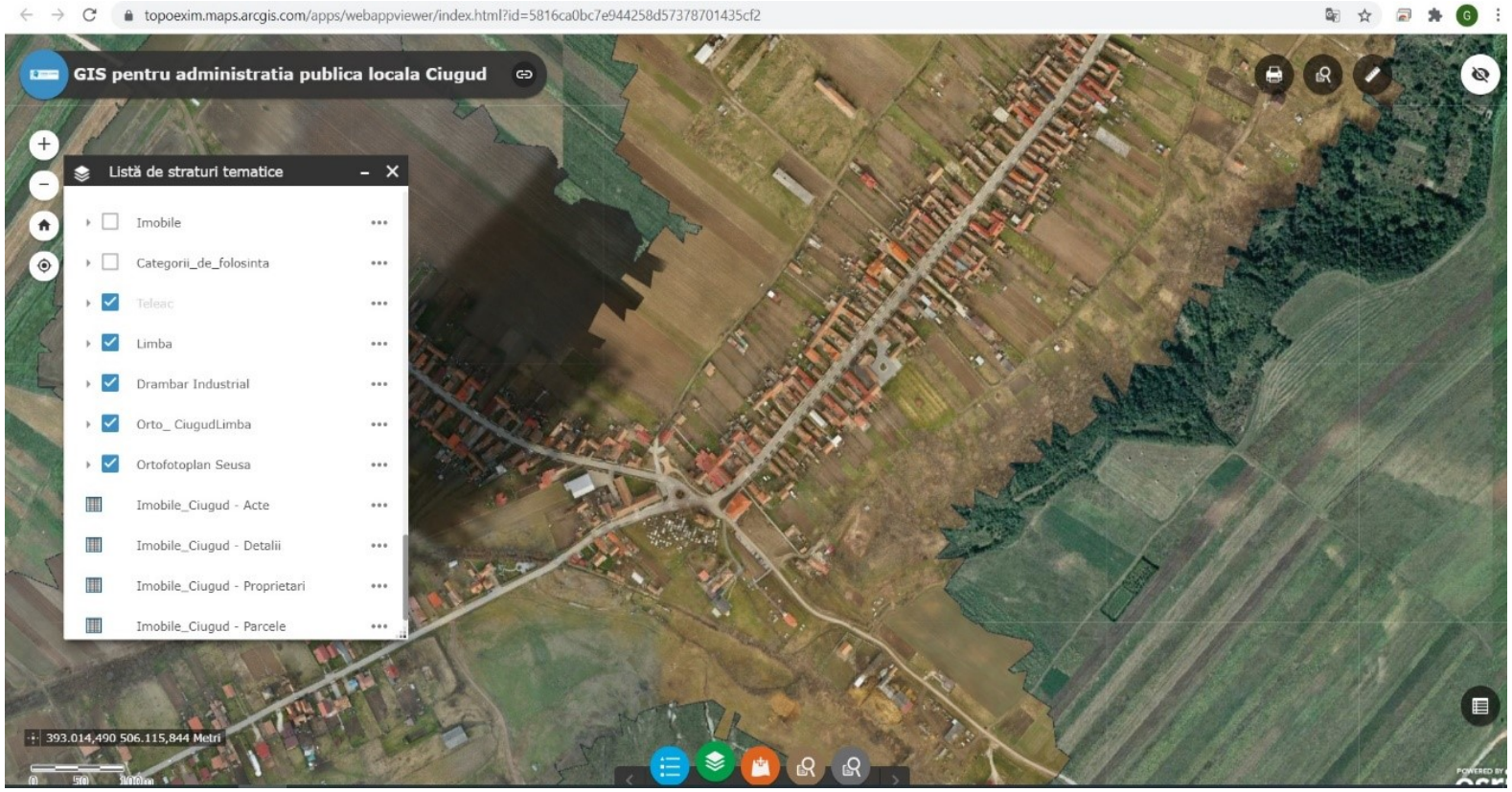

Photo 7 - Photogrammetry module - orthophotoplan made with low altitude flight for urban area and orthophotoplan made at high altitude for extra – urban area.

4.4. Natural environment module

- the map of the slopes and the exposure of the slopes - the slope, the inclination of the earth's surface
- soil map (description, class, intensity, code, area, location, etc.)
- geological map (description, code, observations, location, etc.)
- geomorphological processes (landslides, collapses, observations, location, etc.)
- establishing areas at risk of sliding, with possible risk of flooding, with possible risk of pollution

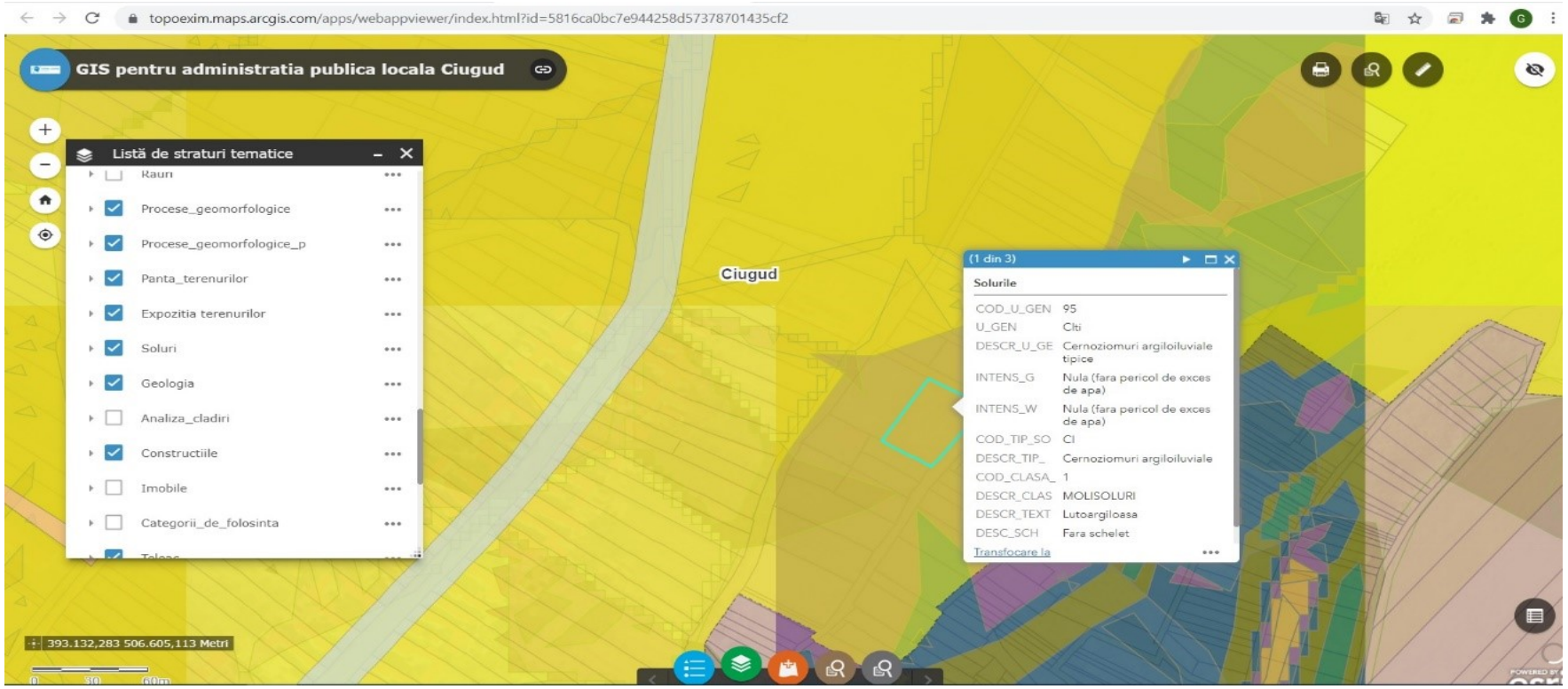

Photo 8 - Natural framework module - soil map, geological map, risk areas, etc.

4.5. Urban and municipal network cadastre module:

- The street lighting network, with the positioning of each pole and the connection with the subscribers;
- The sewerage network with the positioning of each channel and the connection with the subscribers;
- Drinking water supply network with the positioning of each channel and the connection with subscribers;
- The natural gas network with the positioning of each gas vent and the connection with the subscribers;
- Internet and telephony network
- Magistral networks of gas, oil, etc.
- other types of existing urban networks at the locality level

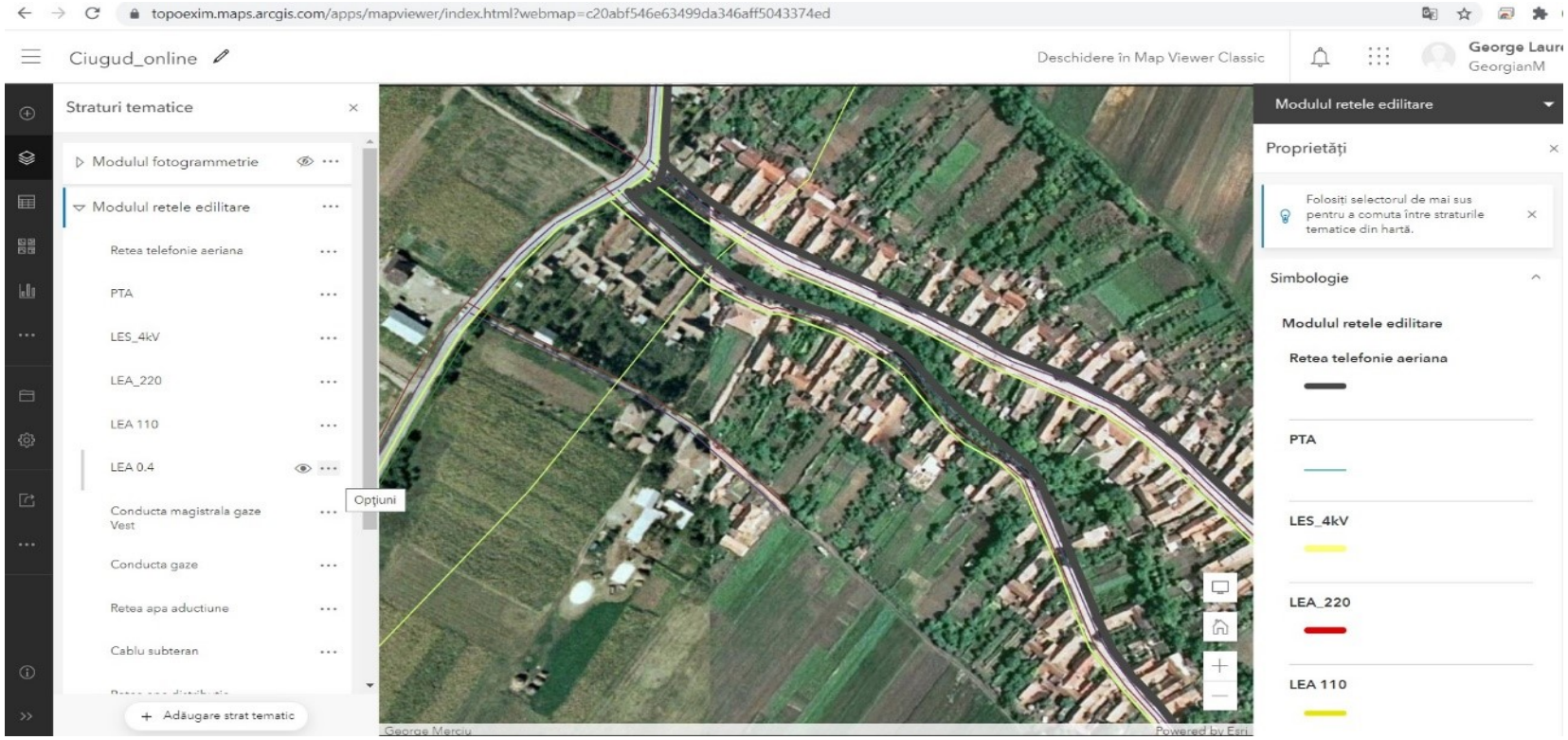

Photo 9 - Urban and municipal networks cadastre module: electricity networks, drinking water networks, sewerage networks, gas networks, etc

4.6. Fees and taxes module

- **- it works conditioned by the existence of the cadastre module**
- - a fiscal sectorization of the locality can be achieved, established by the mayor's office depending on the type and the specific tax value.
- - display on the map the value of the tax established by the mayor's office and the collection of the tax for a certain real estate
- **- the operation of the module is closely related to the type of the existing IT infrastructure within the mayor's office for the service of taxes and fees.**

- Photo 10 - Fees and taxes module - view of the buildings for which taxes have been paid.

4.7. RENS module

- postal numbers (administrative address, postal numbers, street names, etc.). **For integration into the RENNS platform, a data transfer method to the platform must be established, together with ANCPI.**

5. The advantages of the proposed GIS

The advantage would be that the data would be on a single server, each service (department) in the city hall would have access to its domain. Any database changes are automatically updated for each component so that the information is up to date.

The updating of the basic (cadastral) information should be carried out periodically by ANCPI by migrating the data to the mayor's office, taking into account the dynamics in the cadastral field (transactions, inheritances, annexations, dismemberments, etc.).

Based on the information entered in the GIS application, the necessary information, both to the local administration and to the citizens, can be accessed.

The local administration will be able to generate reports at any time based on real data, so that at county and national level there is clear and accurate evidence.

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6. Conclusions

Such a type of database can be accessed at any time very easily, both by local, county or central authorities, but also by any citizen.

To be useful, the information must be constantly updated by uploading changes of any kind to the database.

The database can be supplemented also with other types of information, necessary for a certain compartment.

The database can be changed if users need certain other commands or information.

For the real and efficient use of the database, at least one specialist with a minimum knowledge of using CAD programs is required

Photogrammetric flights can offer many benefits. The resulting products are very useful for visualizing areas where changes have taken place in urban areas (unauthorized construction, illegal deforestation, improper use of land, etc.). Also, they are very useful for design works, pre-feasibility studies, feasibility, techniques, etc., in the sense that topographic data (without which such works cannot be performed) can be made available to the designer or City Hall specialists. This reduces project costs. Projects can be of water, sewer, gas, environmental, etc.

Another proposed solution is to perform laser scans with a mobile scanner, which gives a real image of the streets, traffic signs, properties, road conditions, etc. In this way, a three-dimensional image of the urban area is obtained and it facilitates a correct decision making in the local administration.