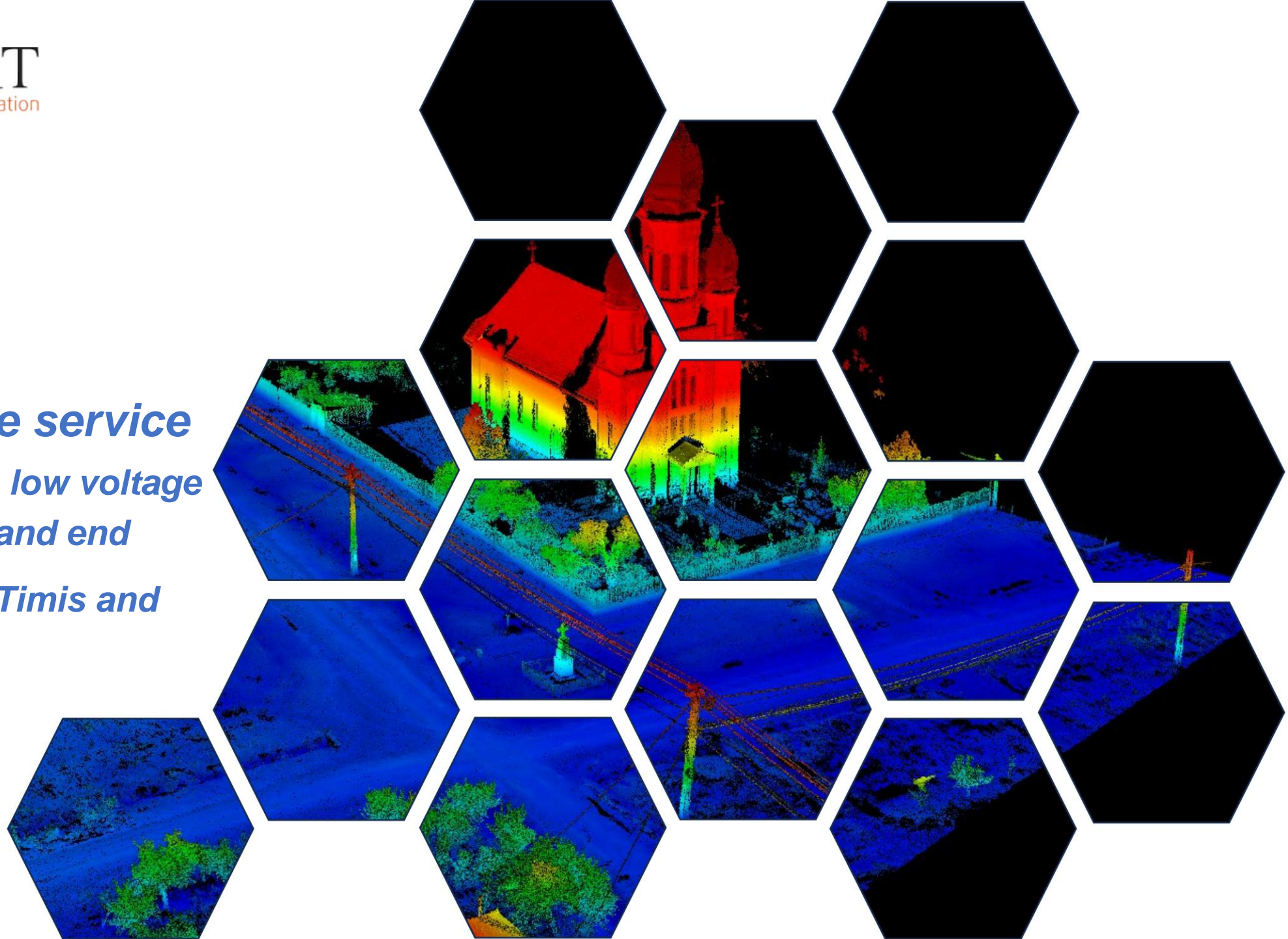


***Provision of the service
Digitalization of the low voltage
electricity network and end
users - Districts of Timis and
Arad.***



Purpose of work and summary of activities

Digitalization and updating of the LV electricity distribution network in urban and sub-urban areas of the Timis and Arad districts.

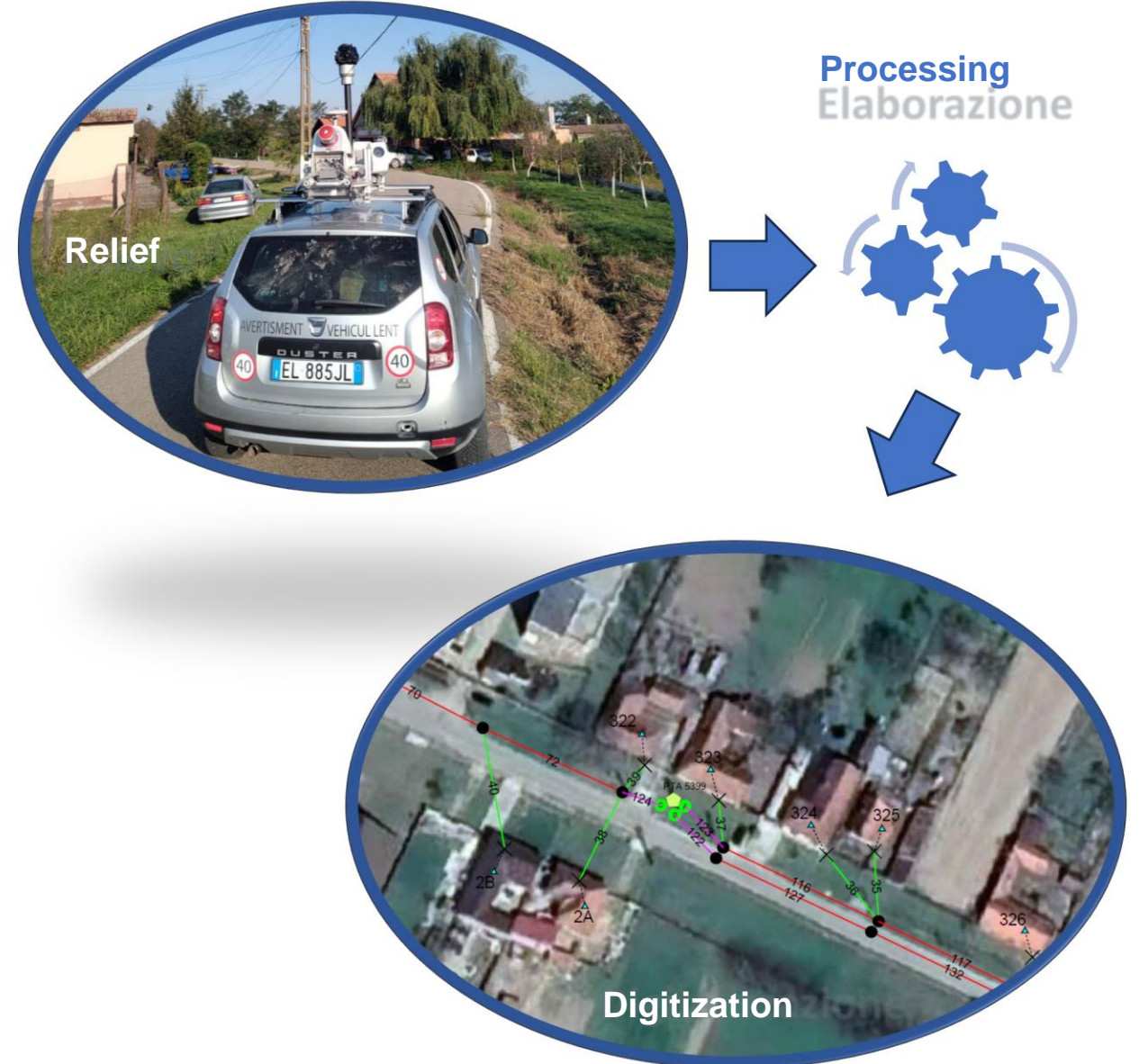
For this purpose, a field survey campaign was planned and carried out, with an advanced platform Mobile Mapping System, aimed at:

- **Rebuild the network topology**
- **Georeference the PTs and the users connected to them**
- **Transfer the information acquired into the platform**

customer IT

PHASES OF WORK

- Analysis of input data
- Field surveys
- Lidar classification
- Network and User Classification
- Civic georeferencing



Work phases: Analysis of incoming data

The input data proved insufficient for the correct planning of the surveys, due to incompleteness or ambiguity of the data.

A long phase of correction and adaptation of the information, with the precious support of the Client and of databases and public road maps found online, led to the definition of the routes to be surveyed.

The survey campaigns were planned for complete coverage of the urban and sub-urban areas of the locations of interest.

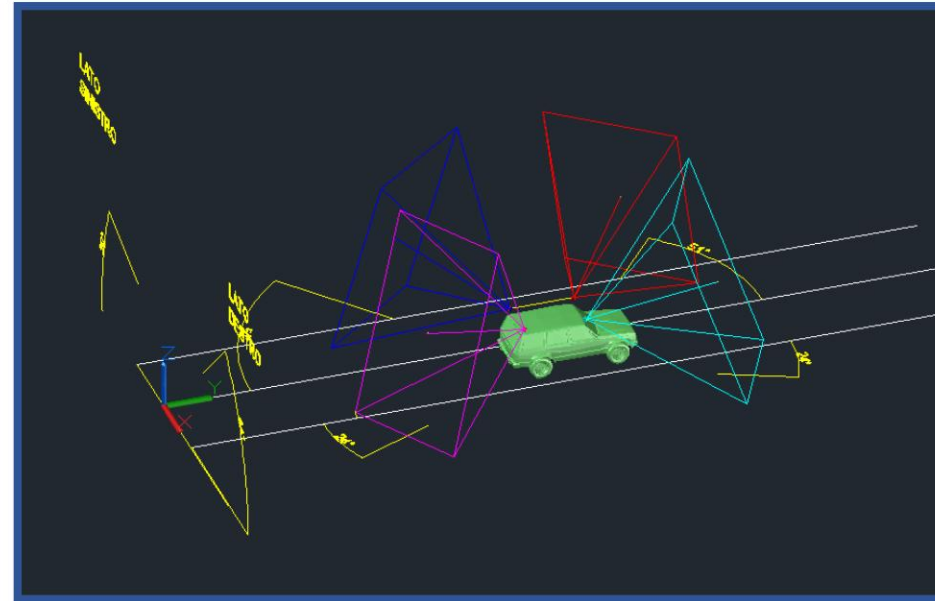


Work phases: Field surveys

The surveys were carried out with the MMS (Mobile Mapping System) platform, installed on a 4x4 vehicle also suitable for rural routes.

The platform was specifically customized for the survey specifications and composed of the main components of:

- Appalnix navigation system
- Riegl Laser Scanner
- Flir Ladybug 360° panoramic camera
- Set of 4 high definition rectangular cameras



Work phases: Unclassified point cloud acquisition

The navigation system, consisting of GNSS receiver, IMU inertial system and Odometer allowed to georeference all the data detected with very high precision:

- Fullwaveform laser point clouds with a minimum density of 300 pt/m²
- 32 Mpixel 360° panoramic photos with shutter intervals every 5 m
- Set of 4 rectangular images of 50 Mpixel and shooting rate of 3 photos/sec



Work phases: Point cloud classification

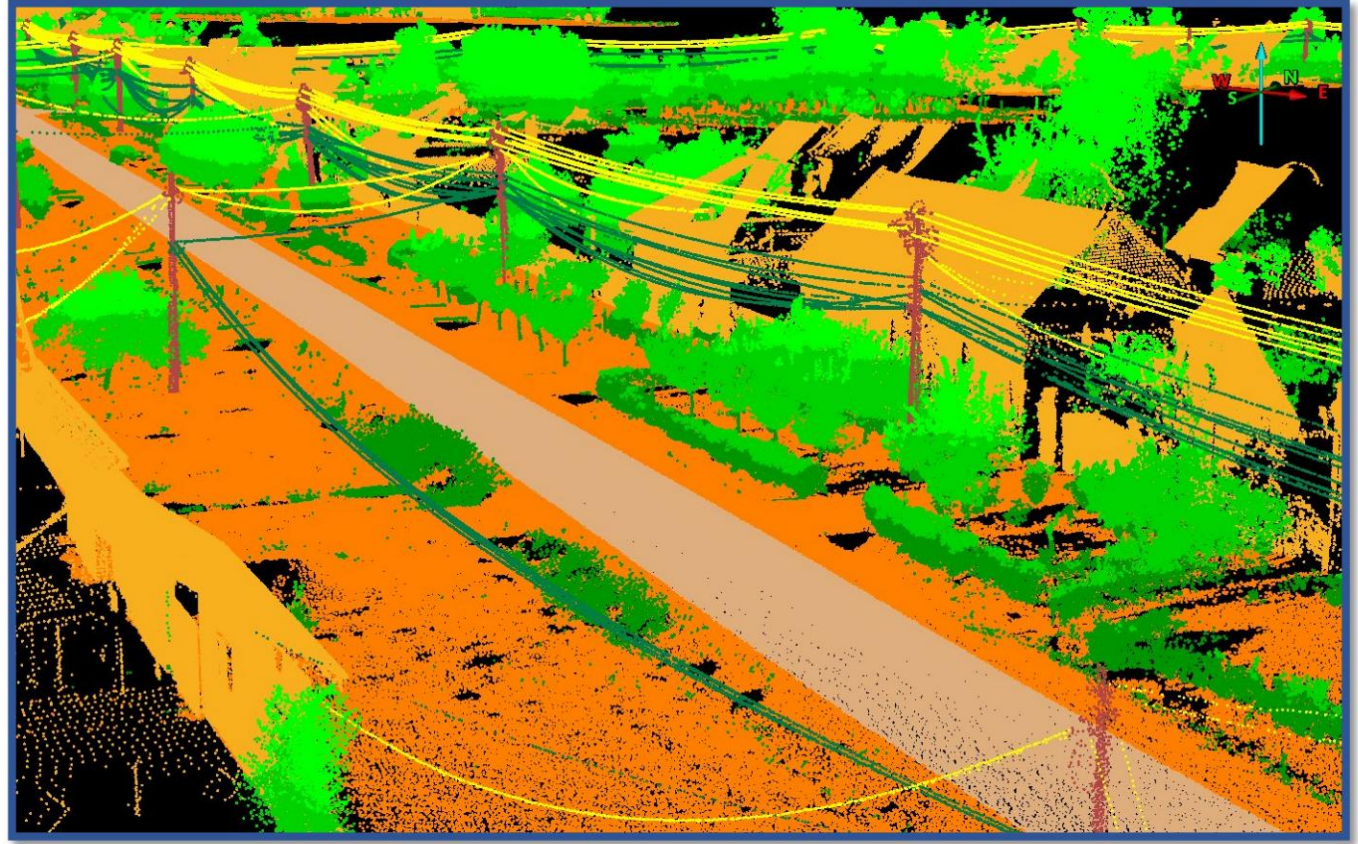
The laser point clouds have been carefully classified to define the geographic context and topology of the net:

The elements of the territory have been classified:

- Land
- Roads
- Buildings
- Vegetation

And the network elements:

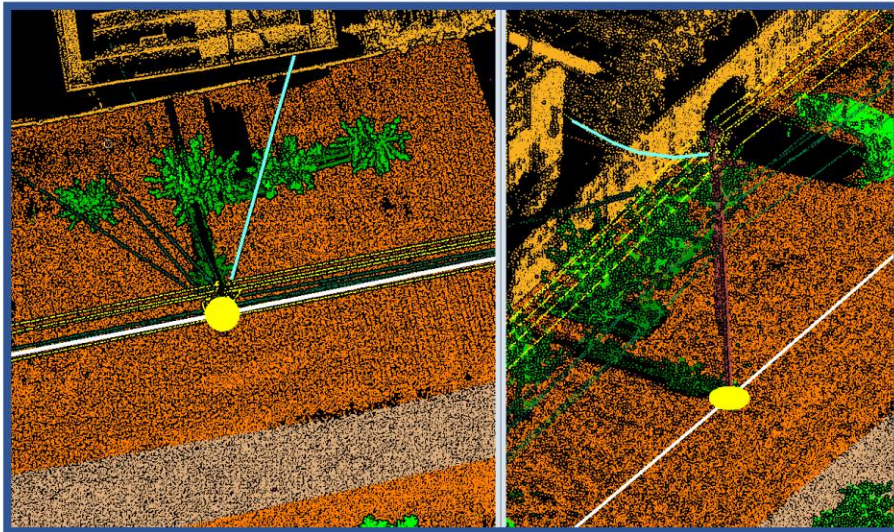
- Supports
- Conductors and connections
- Other cables (MV, TLC, other)



Work phases: Classification of the electricity network and utilities

The positions of the supports and the backbone and branch network layouts were extracted from the laser point clouds.

Subsequently, the connections were extracted and, with the support of high resolution images, the type of cable was identified: bare or insulated and the class to which it belongs.



Work phases: Classification of the electricity network and utilities

The panoramic images, rectified and displayed in a special software application in sync with the laser point clouds, were used for the general overview of the network and for the rapid identification of the users.

360° panoramic photo



photo oriented and rectified by the viewing software.



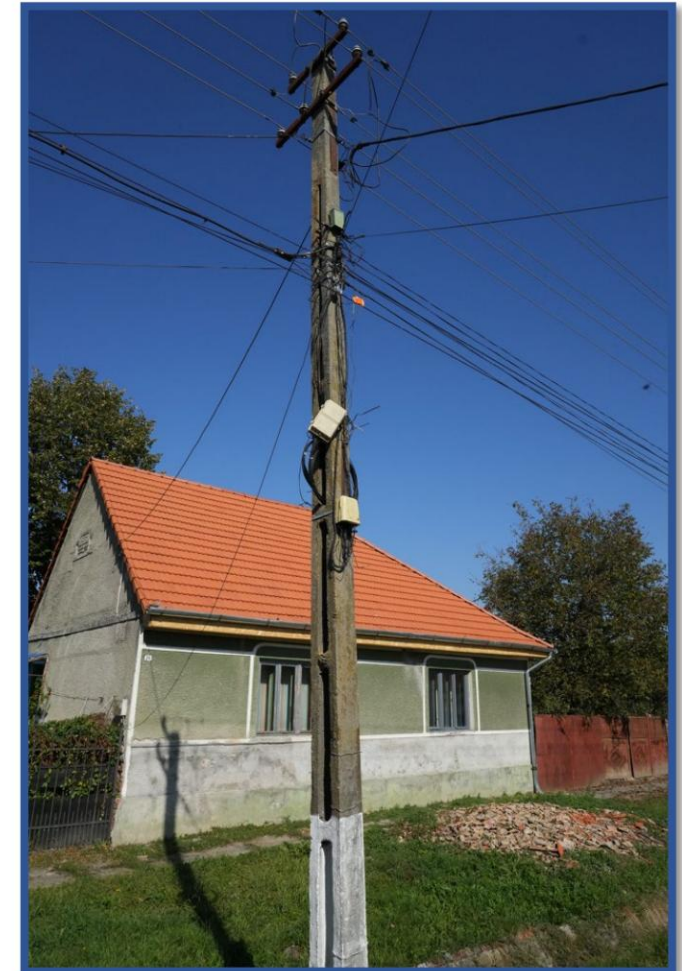
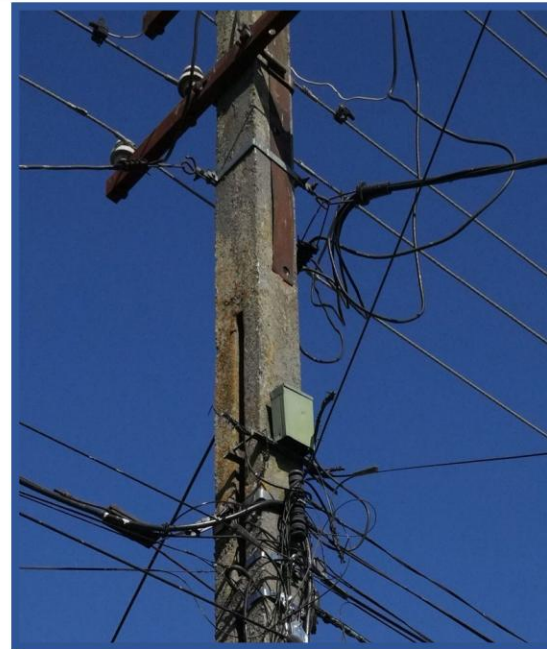
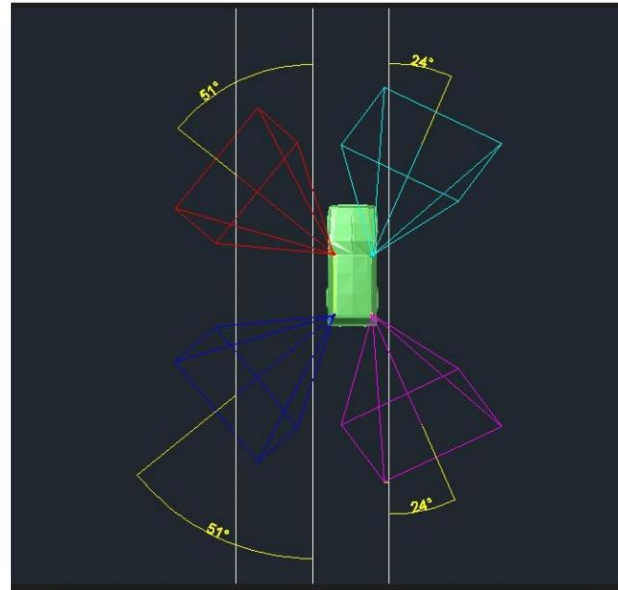
Work phases: Classification of the electricity network and utilities

The high resolution rectangular images, acquired by 4 synchronized cameras, installed in position:

Front-Right,
Front-Left,
Rear-Right,
Rear-Left,

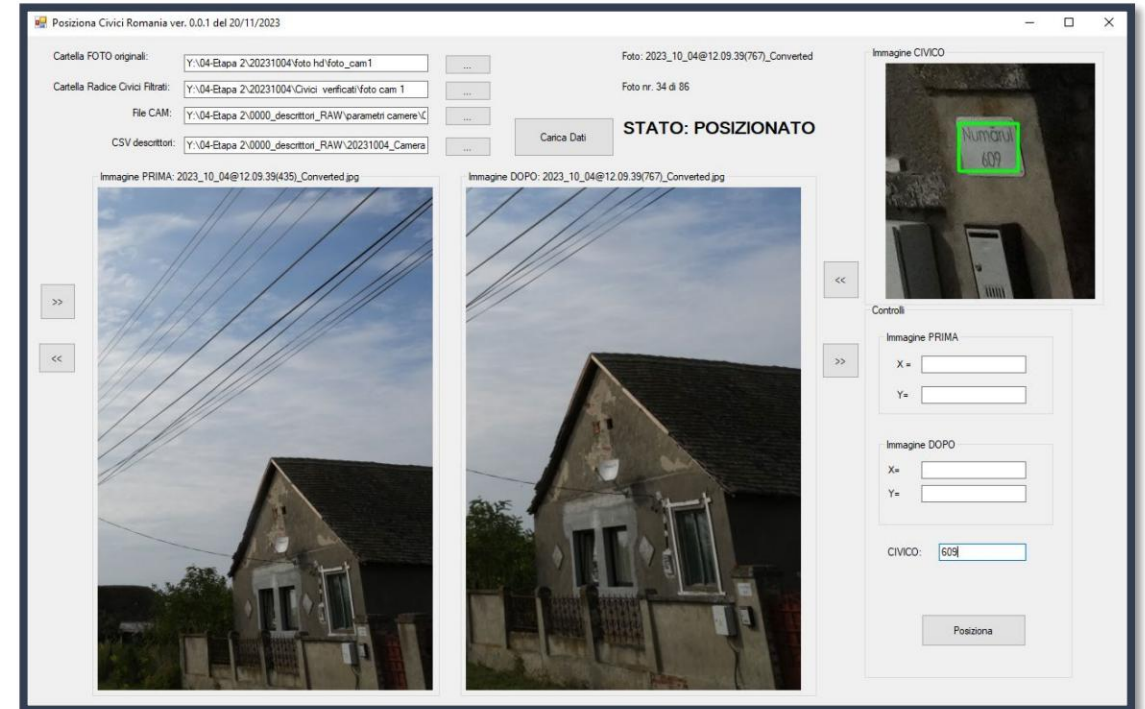
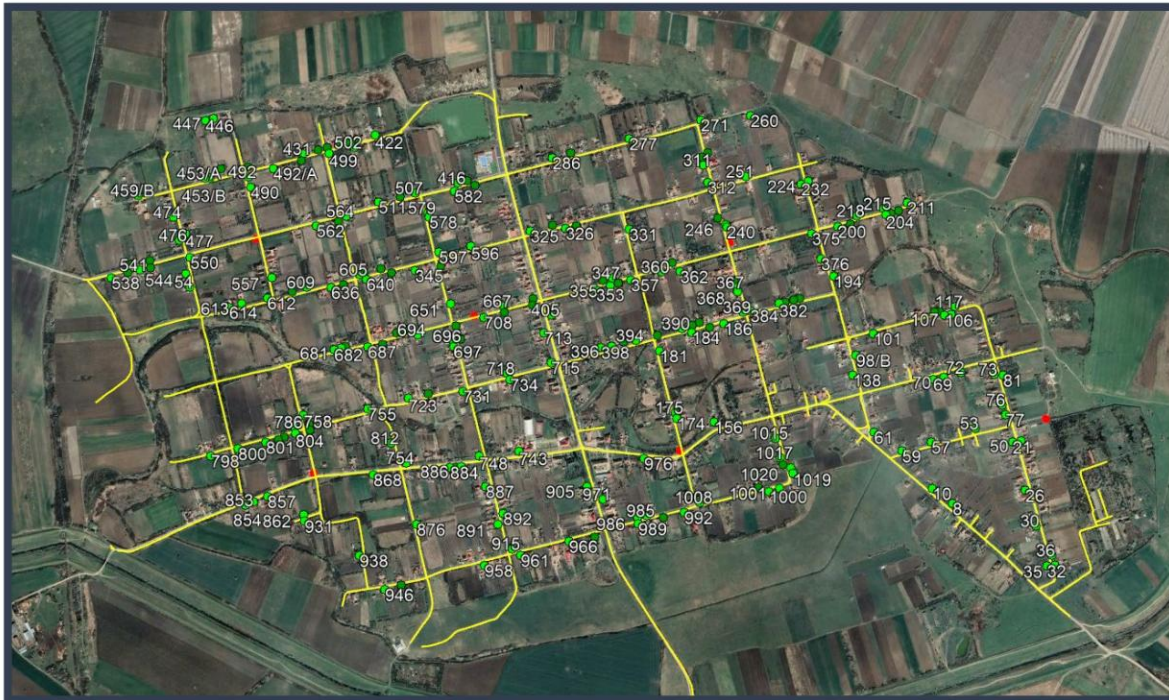
allowed us to detect in detail:

- connections,
- type of cable,
- house numbers.



Work phases: Civic georeferencing

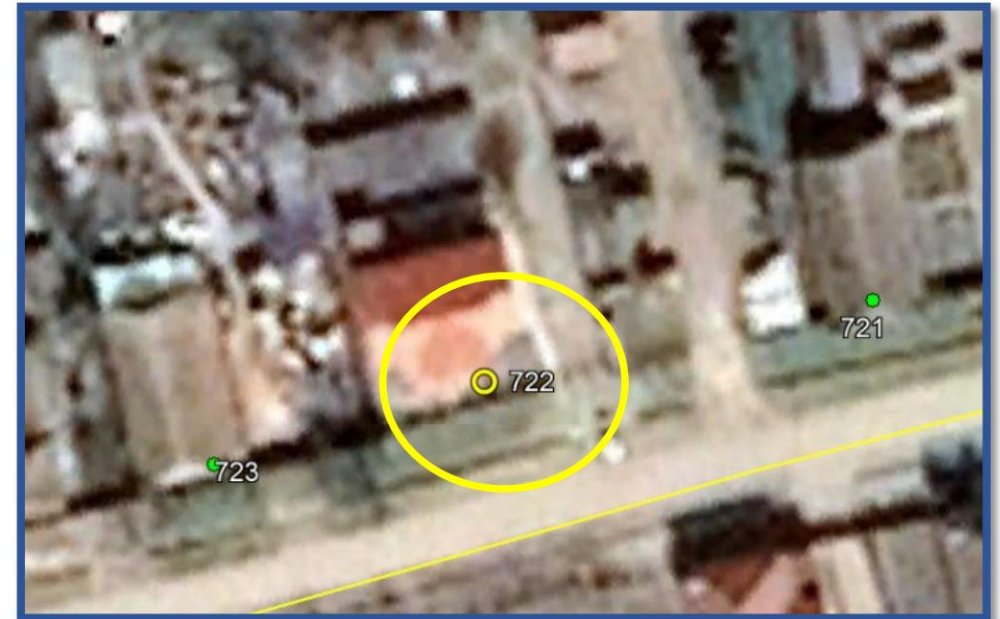
To identify and georeference house numbers, an Artificial Intelligence algorithm was developed which allowed the numbers to be identified and subsequently georeferenced thanks to the navigation data acquired during the survey



Work phases: Civic georeferencing

The production of the final documents was carried out by standardizing and verifying the data contained in the DB

Customer with those acquired in the field.



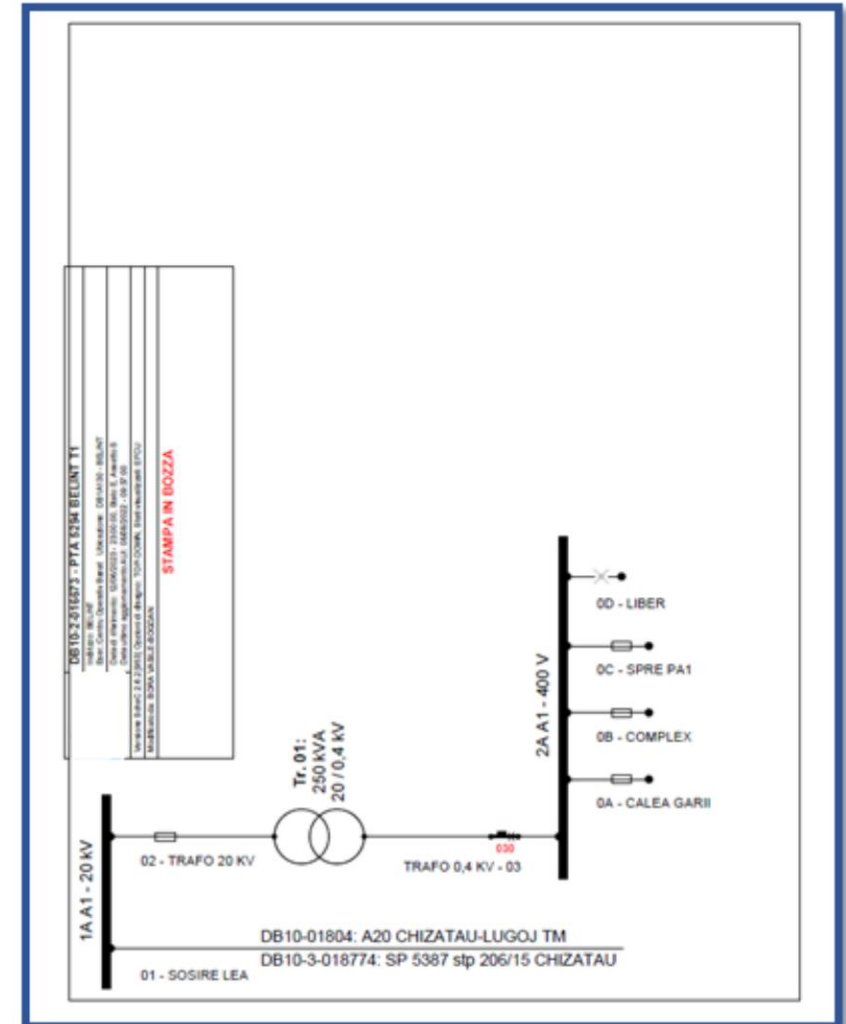
● Civic Surveyed ● Civic associate

Associated Civic:

Building connected to an active user
(present on Eneltel) without house number.

Work phases: Civic georeferencing












For each location detected, the information obtained was divided by PT circuit and by no. of active backbones.

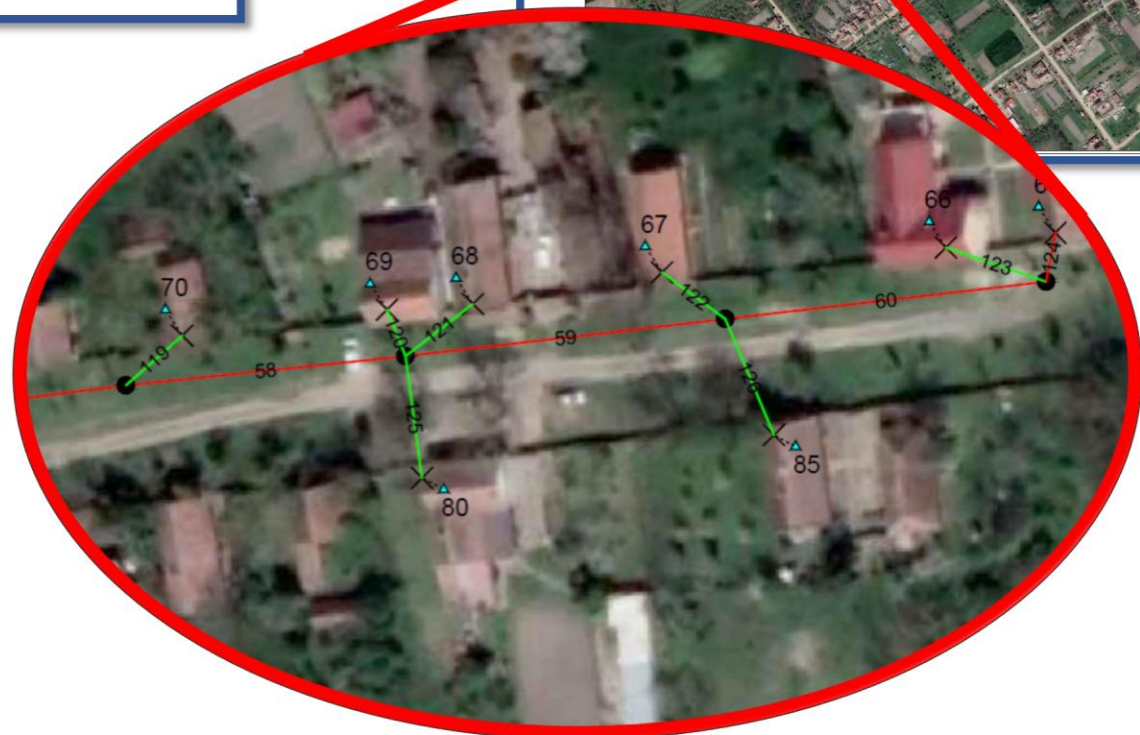


Products:

The final products, following strict quality controls, were exported in the formats required by the Customer's graphics platform.

The data was produced in tabular format and printouts with the network diagrams and registered users, divided by location and circuit.

-  AUXILIAR.xls
-  BMP.xls
-  DERIV_CT.xls
-  INC_LINI.xls
-  Leg_Noduri.xls
-  Leg_NrStr.xls
-  NR_STR.xls
-  Ramuri.txt
-  Ramuri_Noduri.xls
-  T 2539_1.pdf
-  T 2539_2.pdf



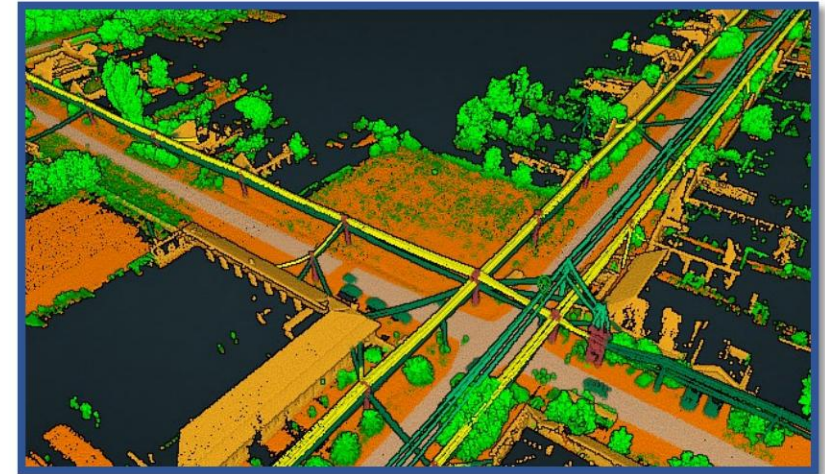
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	Join_Count	MATERIAL	CIR	COD_MATERI	POZARE	ID	LUNGIME	DENUMIRE	STARE_CONE	COD_SOCIED	COD_ZONA	NR_NOD	SERIE_NOD	POINT_X	POINT_Y	
2	1	C83 // 3x70+54_A	0	83	C	0	45	Stalp	C-inchis	DB10	1A		250139	6	218394.276	466199.686
3	1	C83 // 3x70+54_A	0	83	C	0	45	Stalp	C-inchis	DB10	1A		250138	6	218369.399	466237.123
4	1	C83 // 3x70+54_A	0	83	C	1	35	Stalp	C-inchis	DB10	1A		250138	6	218369.399	466237.123
5	1	C83 // 3x70+54_A	0	83	C	1	35	Stalp	C-inchis	DB10	1A		250137	6	218349.808	466266.038
6	1	C83 // 3x70+54_A	0	83	C	2	38	Stalp	C-inchis	DB10	1A		250137	6	218349.808	466266.038
7	1	C83 // 3x70+54_A	0	83	C	2	38	Stalp	C-inchis	DB10	1A		250136	6	218329.087	466297.332
8	1	C83 // 3x70+54_A	0	83	C	3	35	Stalp	C-inchis	DB10	1A		250136	6	218329.087	466297.332
9	1	C83 // 3x70+54_A	0	83	C	3	35	Stalp	C-inchis	DB10	1A		250135	6	218309.715	466326.496
10	1	C83 // 3x70+54_A	0	83	C	4	31	Stalp	C-inchis	DB10	1A		250135	6	218309.715	466326.496
11	1	C83 // 3x70+54_A	0	83	C	4	31	Stalp	C-inchis	DB10	1A		250215	6	218292.917	466352.375
12	1	C83 // 3x70+54_A	0	83	C	5	43	Stalp	C-inchis	DB10	1A		250134	6	218290.891	466354.805
13	1	C83 // 3x70+54_A	0	83	C	5	43	Stalp	C-inchis	DB10	1A		250188	6	218325.031	466380.253
14	1	C83 // 3x70+54_A	0	83	C	6	40	Stalp	C-inchis	DB10	1A		250188	6	218325.031	466380.253
15	1	C83 // 3x70+54_A	0	83	C	6	40	Stalp	C-inchis	DB10	1A		250189	6	218356.715	466404.186
16	1	C83 // 3x70+54_A	0	83	C	7	44	Stalp	C-inchis	DB10	1A		250189	6	218356.715	466404.186
17	1	C83 // 3x70+54_A	0	83	C	7	44	Stalp	C-inchis	DB10	1A		250190	6	218391.887	466430.533
18	1	C83 // 3x70+54_A	0	83	C	8	41	Stalp	C-inchis	DB10	1A		250190	6	218391.887	466430.533
19	1	C83 // 3x70+54_A	0	83	C	8	41	Stalp	C-inchis	DB10	1A		250191	6	218424.698	466455.511
20	1	C83 // 3x70+54_A	0	83	C	9	39	Stalp	C-inchis	DB10	1A		250191	6	218424.698	466455.511
21	1	C83 // 3x70+54_A	0	83	C	9	39	Stalp	C-inchis	DB10	1A		250192	6	218455.761	466478.805
22	1	C83 // 3x70+54_A	0	83	C	10	32	Stalp	C-inchis	DB10	1A		250192	6	218455.761	466478.805
23	1	C83 // 3x70+54_A	0	83	C	10	32	Stalp	C-inchis	DB10	1A		250193	6	218481.751	466498.006
24	1	C83 // 3x70+54_A	0	83	C	11	29	Stalp	C-inchis	DB10	1A		250193	6	218481.751	466498.006
25	1	C83 // 3x70+54_A	0	83	C	11	29	Stalp	C-inchis	DB10	1A		250194	6	218504.462	466515.469
26	1	C83 // 3x70+54_A	0	83	C	12	37	Stalp	C-inchis	DB10	1A		250221	6	218512.028	466524.508
27	1	C83 // 3x70+54_A	0	83	C	12	37	Stalp	C-inchis	DB10	1A		250177	6	218542.564	466545.511
28	1	C83 // 3x70+54_A	0	83	C	13	37	Stalp	C-inchis	DB10	1A		250177	6	218542.564	466545.511

Products: Repository

The data acquired from the survey:

- Classified laser point clouds
- Panoramic images
- Rectangular images

have been synchronized and calibrated and uploaded to the Client's Repository platform (it is also possible to create it, if not available)

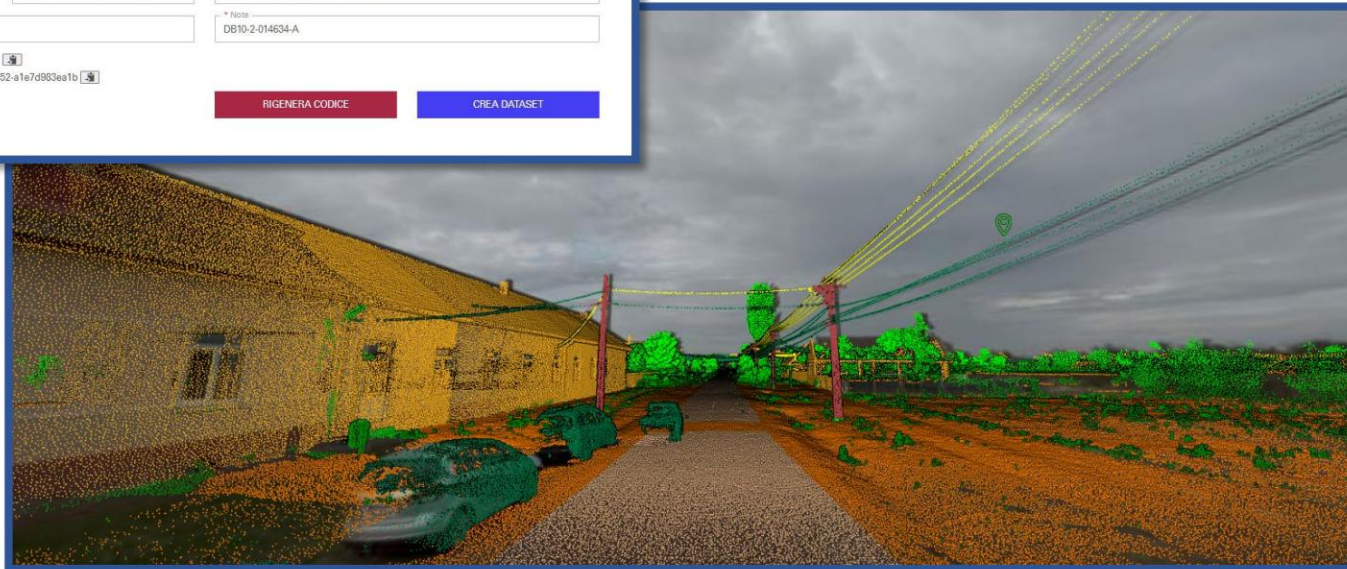


Dataset creato correttamente.

* Elemento di rete / Tipo rilievo Non definito	* Tipi di undefined Mobile Mapping System	* Anno 2023	* Ente rilevatore GEOCART
* Area DB10 - Directia Retea Banat	* CD DB10 - Centru Operativ Banat	Codice MMS-2023-GEOCART-DB10-1_45_43372	
EPSG partenza		* Note DB10-2-014634-A	

Path SFTP: sftp-gridrepo-eu.anel.com
Path remoto: /ccb6ea8f-b8e1-42d5-a352-a1e7d983ea1b

RIGENERA CODICE CREA DATASET



Products: Repository

In accordance with the GDPR (General Data Protection Regulation), all data uploaded to the Repository was anonymized by an Artificial Intelligence algorithm that obfuscated:

- People's faces
- Vehicle license plates



The activities made it possible to detect, survey and produce the following volumes overall:

BT network detected	1736.4 km
Number of Transformation Points detected	314
Number of Circuits mapped	841
Number of users registered	40276