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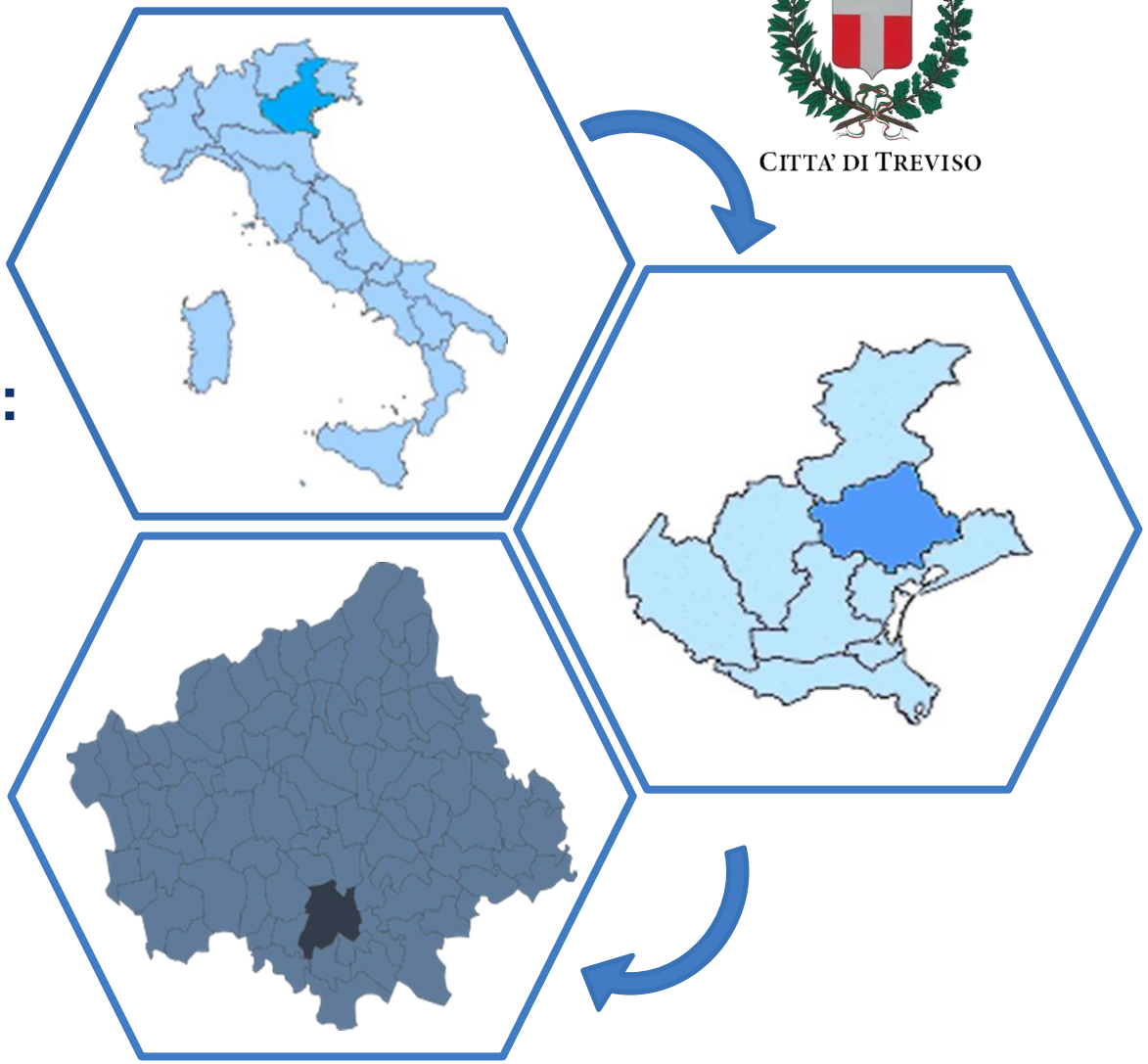
SATSDIFACTION

REGIONE DEL VENETO

CITTA' DI TREVISO

MUNICIPALITY OF TREVISO

The Treviso Territorial Information System: innovation and spatial data for urban management



Organisation/Structure

I.C.T. - Statistics, Patrimony, Demographic services, social, housing
General Manager: Marcello Missagia

G.I.S.- Geographic Information System
Technical Manager: Nadia Poles
Technical Instructor: Stefano Climastone and Marco Sartori

Municipality of **Treviso**

REGION of Veneto

PROVINCE of Treviso

CITY MUNICIPALITY of **Treviso**

The City of Treviso is the **capital of the Province**

Significant data:

- total area	55 square kilometers
- population residents	85,900
- road network	490 kilometers
- buildings	~20,000
- external street door numbers	~25,000

Organisational Structure

Political authority

Technical and administrative offices

GEOGRAPHIC INFORMATION PORTAL – WEB GIS

- Statistics
- Roads and Maintenance
- Patrimony, Provisioning
- Spatial and Urban Planning
- Technical Service
- Private Construction and Productive Activities
- Infrastructure and network management Subservices
- General Affairs, Procurement and Contracts
- Civil Protection
- Realisation of Public Works
- Mobility Manager
- Legal Affairs and Civic Advocacy
- Sport, Culture and School
- Environment
- Demographic services, social, housing and toponymy

Who We Are?

Sector/Area: I.C.T. - Statistics, Patrimony, Demographic services, social, housing

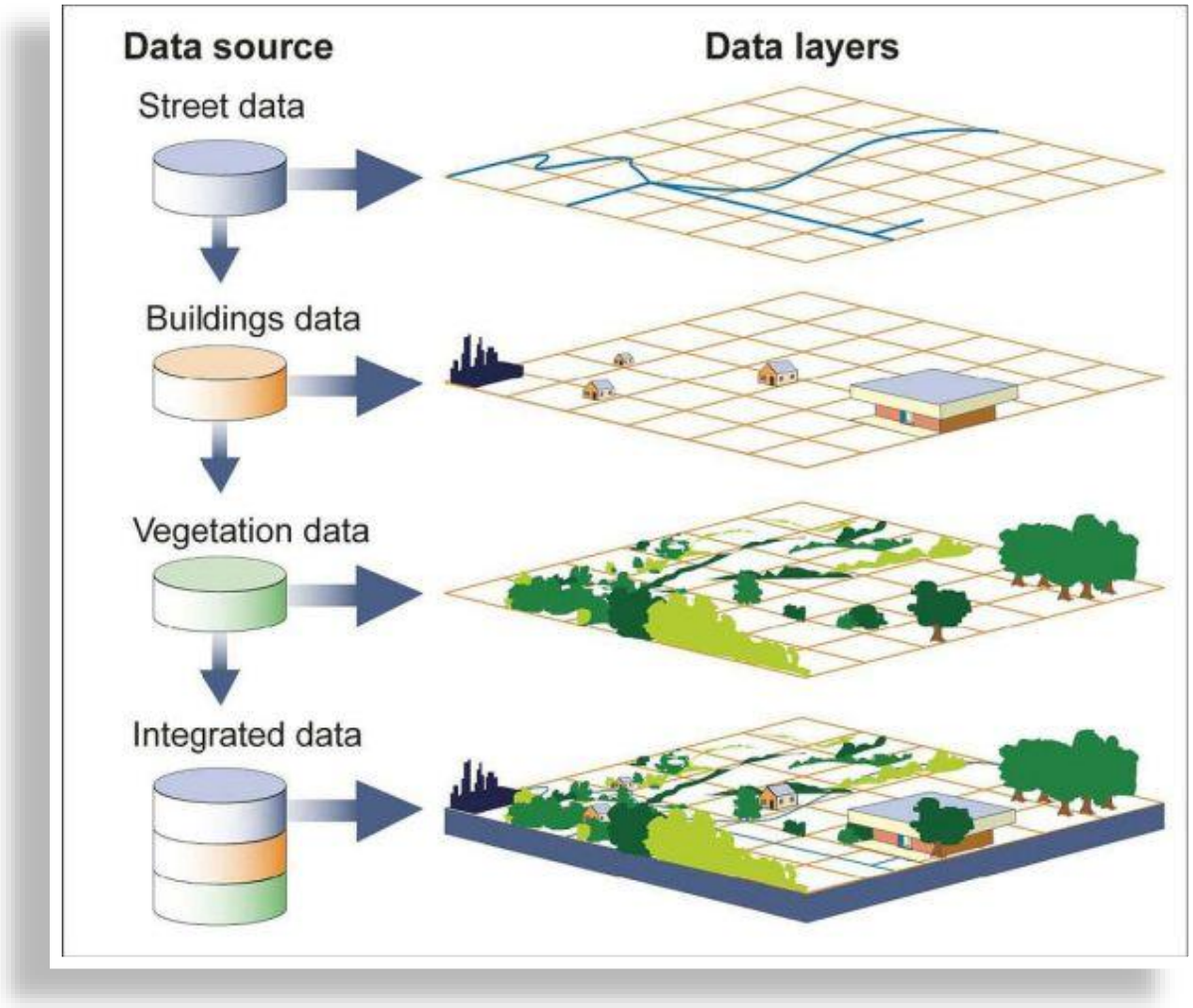
General Manager Marcello Missagia

Technical manager	Instructor	Instructor
Nadia Poles	Stefano Climastone	Marco Sartori

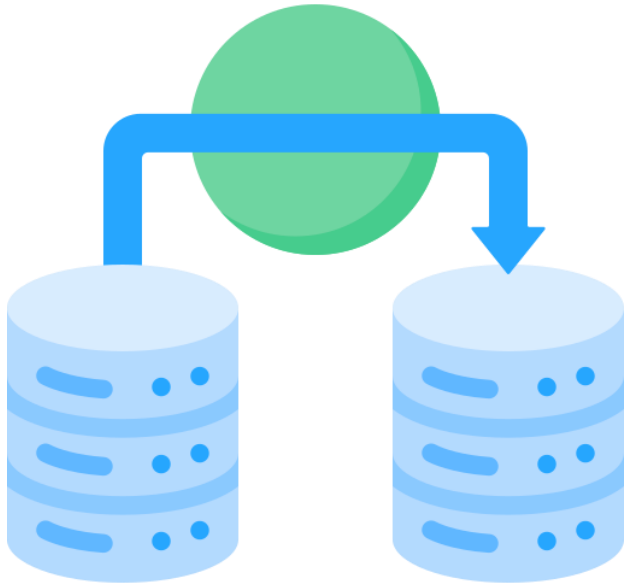
"Core Team"
S.I.T. - G.I.S.

Gis in few words….

Technology
(hardware and software)
+
Spatial data
(databases and cartography)
+
Employees / People



GIS software applications in the Municipality of Treviso



Migration in progress Saas (Software as a Service)

Gis desktop:
GEOMEDIA – AUTOCAD MAP3D and QGIS (Quantum GIS)
Data management system:
Oracle
Map server web-gis:
Map-Guide

Gis Desktop:
QGIS (Quantum GIS)
Data management system:
PostgreSQL/PostGIS
Map server web-gis open source:
Geoserver
Framework web-gis: MapStore and GeoNode

Management of geographic data to reach an **interoperable territorial information system**

Activities implemented…

- Integration of systems and software with the GIS portal
- Ground surveys
- Digitisation of paper archives
- Georeferenced thematic maps
- Updates of databases and base cartography
- Aerial survey and cartographic restitution - GEODBT D.M. 10 November 2011
- Internal training
- Creation of common rules
- Updating of the Building Regulations

QUALITY, ACCURATE AND CONSISTENT DATA

What has been important:

- weaknesses identification
- single Cartographic Geo-portal implementation
- staff training

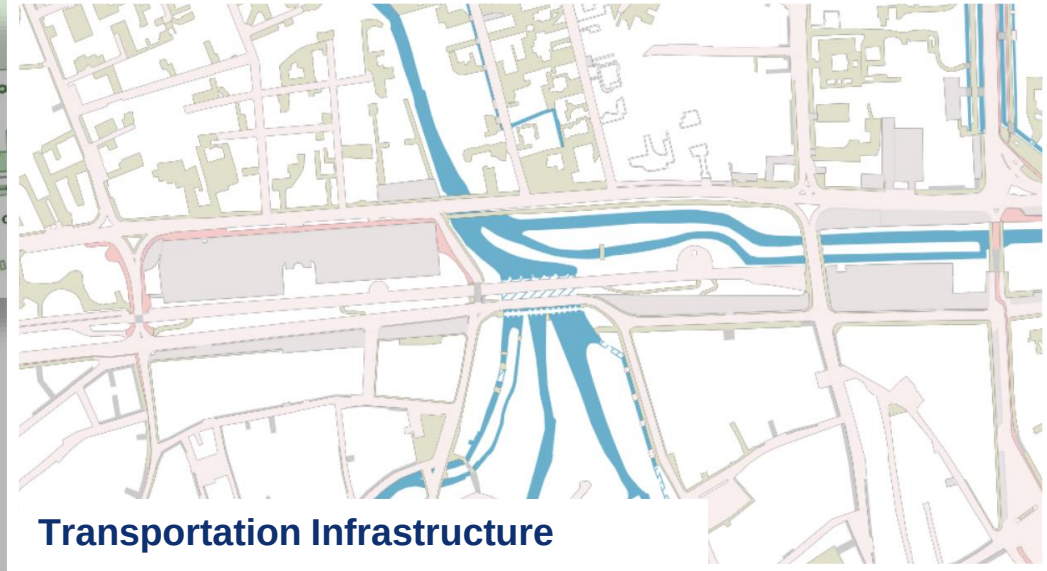
…and

- collaboration with the Veneto Region (RV) and the Agency for Digital Italy (AGID)
- Technological innovation (web service, WMS – WFS and API development).

Best-Practices:
The Treviso Territorial Information System: innovation and spatial data for urban management

How to use satellite and spatial data to detect changes and update the GeoDataBase-Topographical (base map) and its most important datasets:

- buildings and urban areas
- vegetation - urban green areas
- roads



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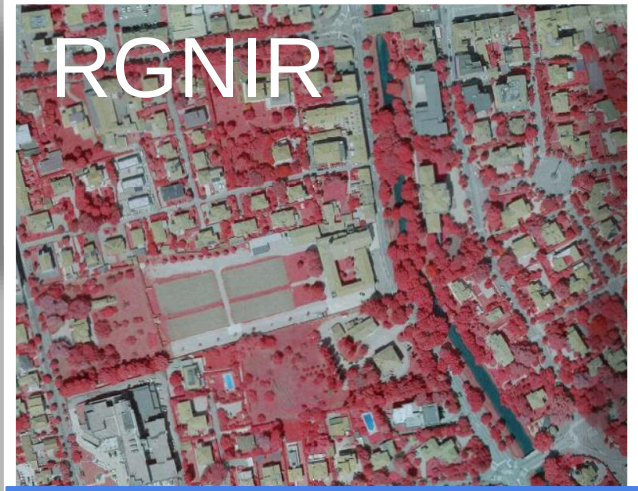
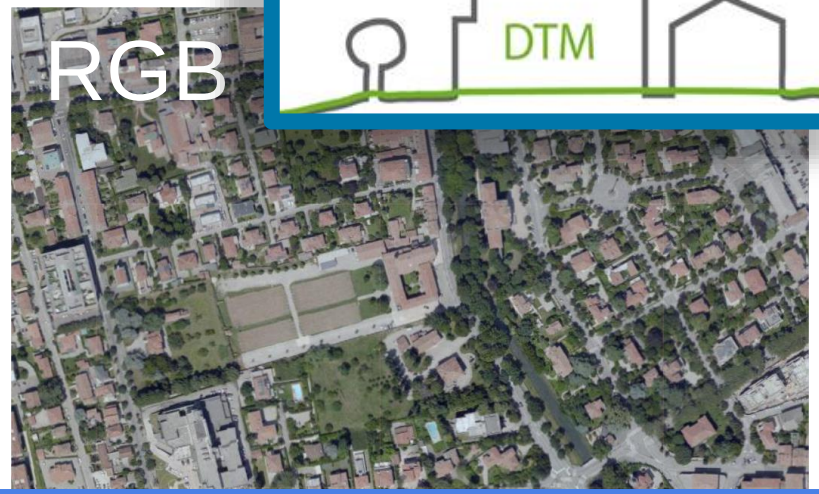
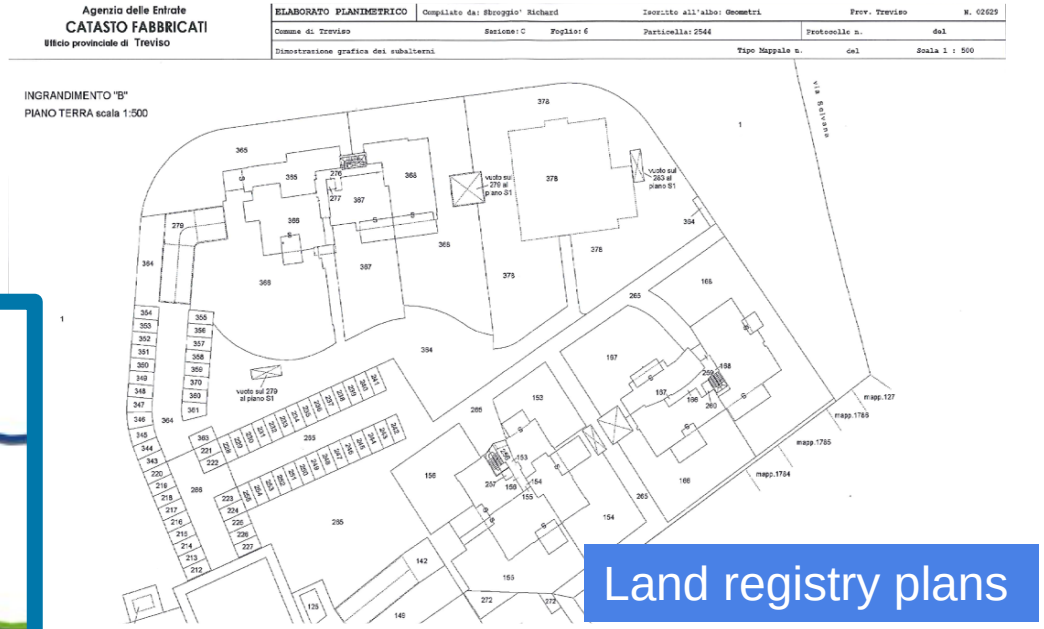
Today, …Earth observation

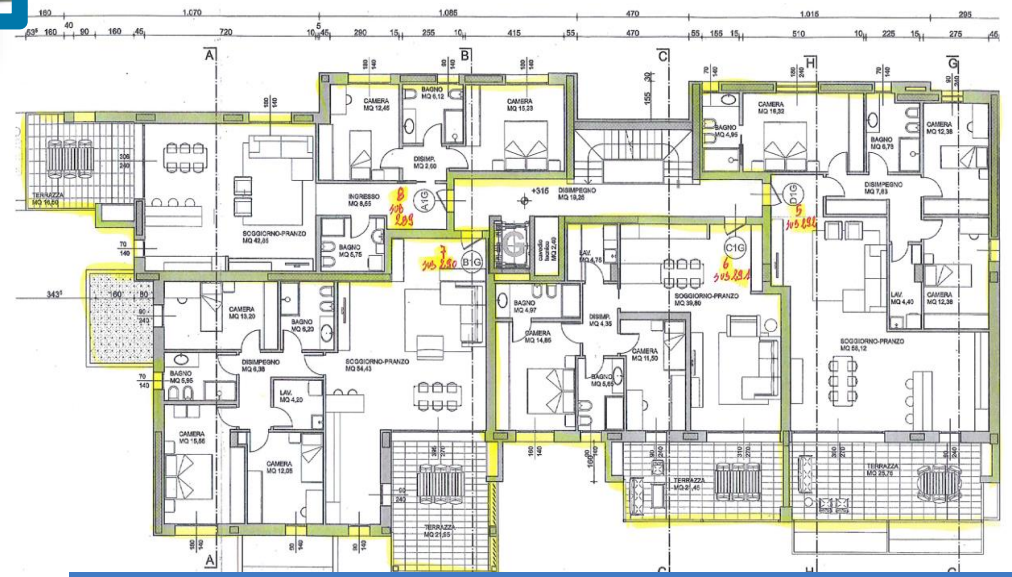




Use of true-orthophotos instead of standard orthophotos (**absence of building leaning effect**) - Digital Orthophoto in True Colour (RGB) and in False Colour (RGNIR) - ground resolution (pixel size) of 10 cm.



Land registry plans

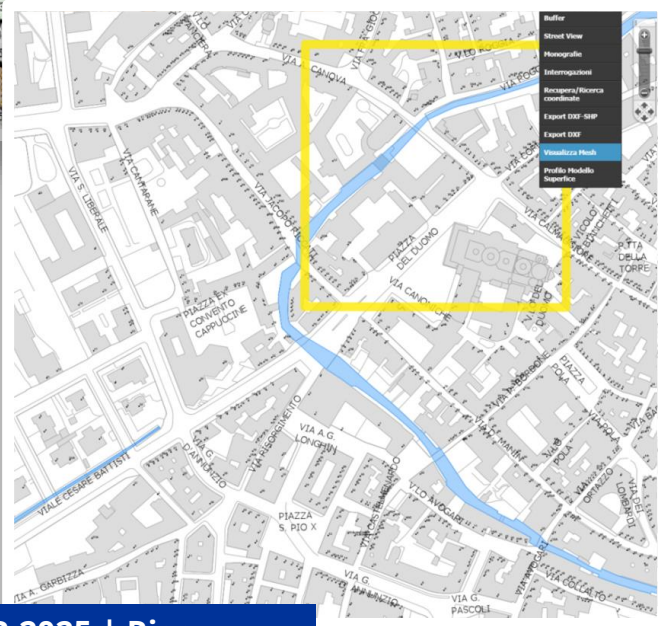


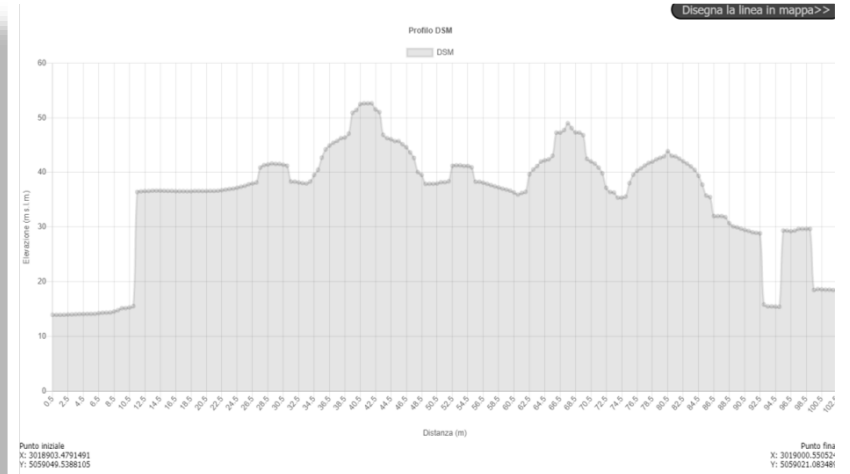
The building/construction practice projects

Today, …Earth observation

...and using the full GIS suite of tools and functionality:

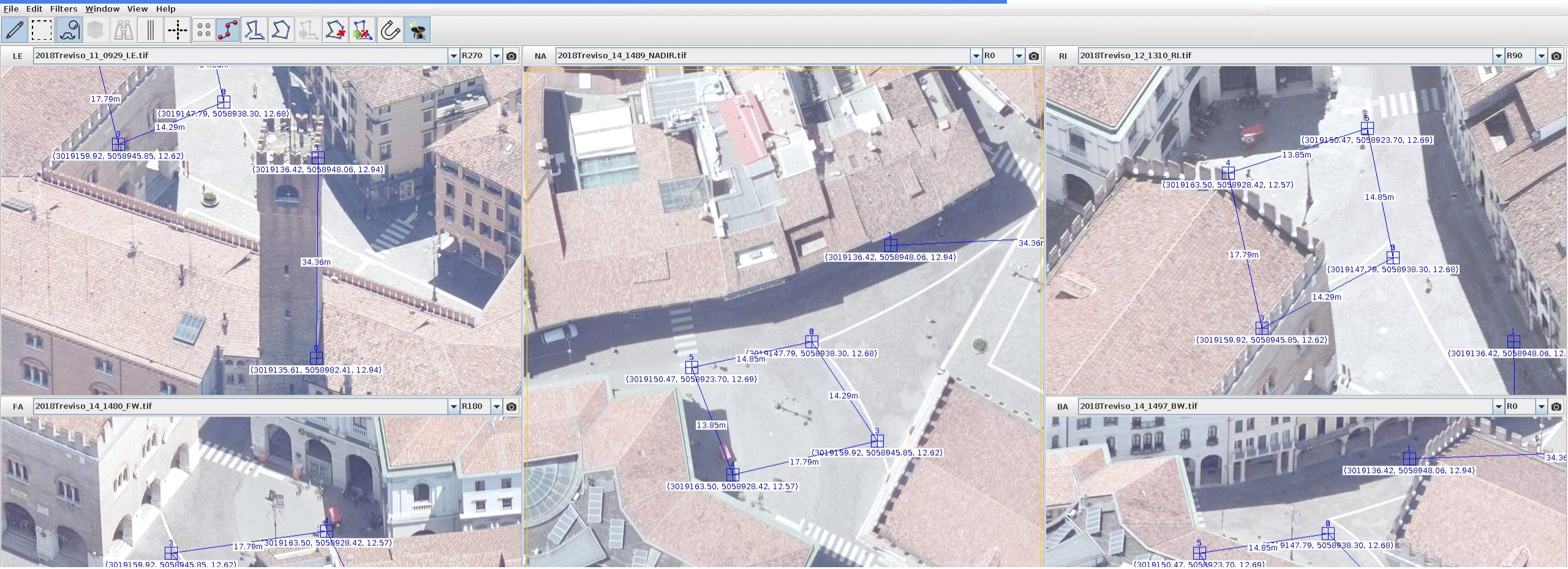
- Measurement of building surfaces and heights with reading and **management of height elevations (Z) of elements;**
- Function "**Surface Model Profile**"
- Function "**3D MESH**" of the selected area





Today, …Earth observation

Oblique aerial images to see, measure and understand

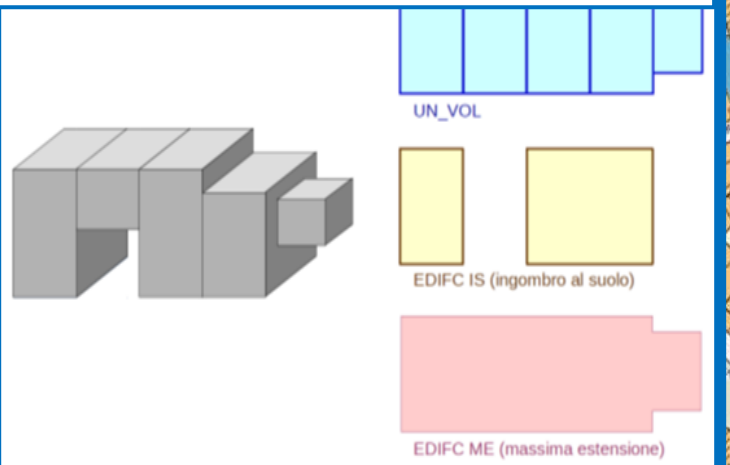


- In oblique aerial images there are less occlusions than in standard nadir images, and vertical elements, like building facades, are visible. This information is essential for professionals: digitisation of building footprints, measurement of vertical features (windows, roof heights,…), inspection of buildings from 360 degrees, 3D mapping and the possible changes to buildings.

Measurement of **building surfaces and heights**

The “Buildings” feature consists of two classes: Building and Volumetric Unit each with its own attribute and specific information –**GEODBT D.M. 10 November 2011-INSPIRE**

Building and Volumetric Unit

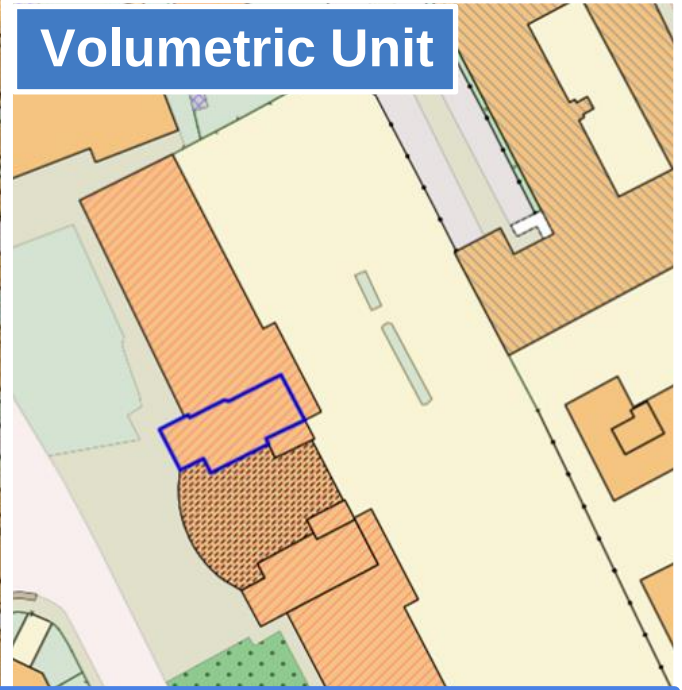


Link WMS GeoDBT edifici

Building

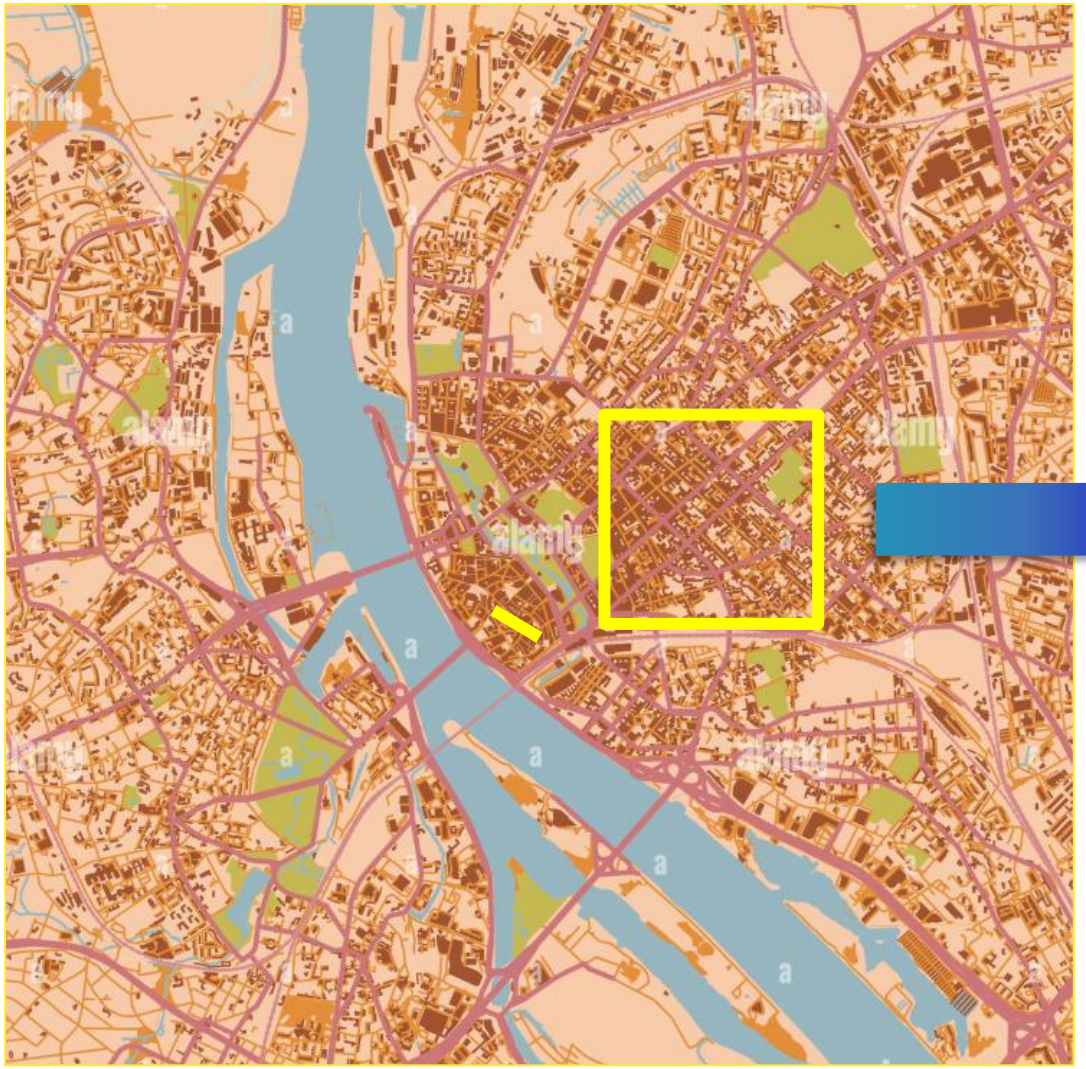
- Maximum building footprint
- Building footprint area
- Building volume

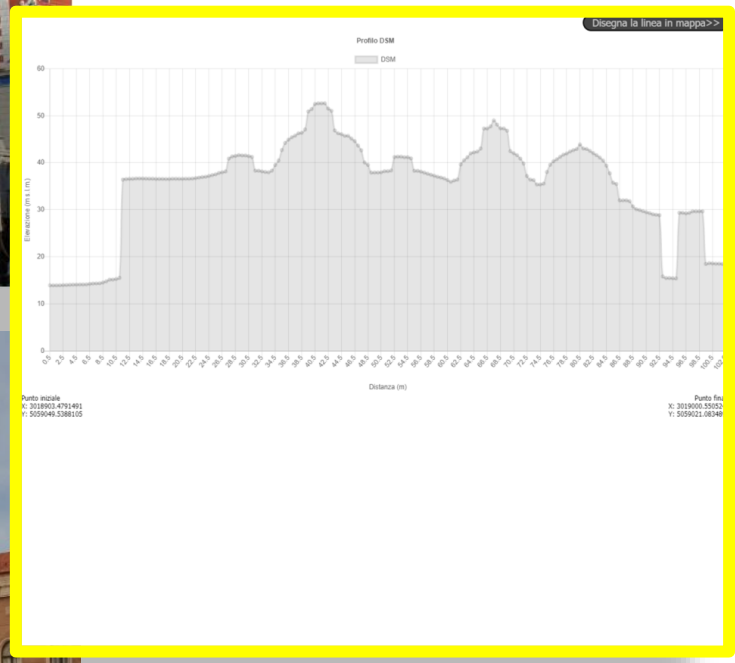
Volumetric Unit



- Geometrically derived portion area
- Height of the building section
- Eaves height
- Base level
- Volume of the portion

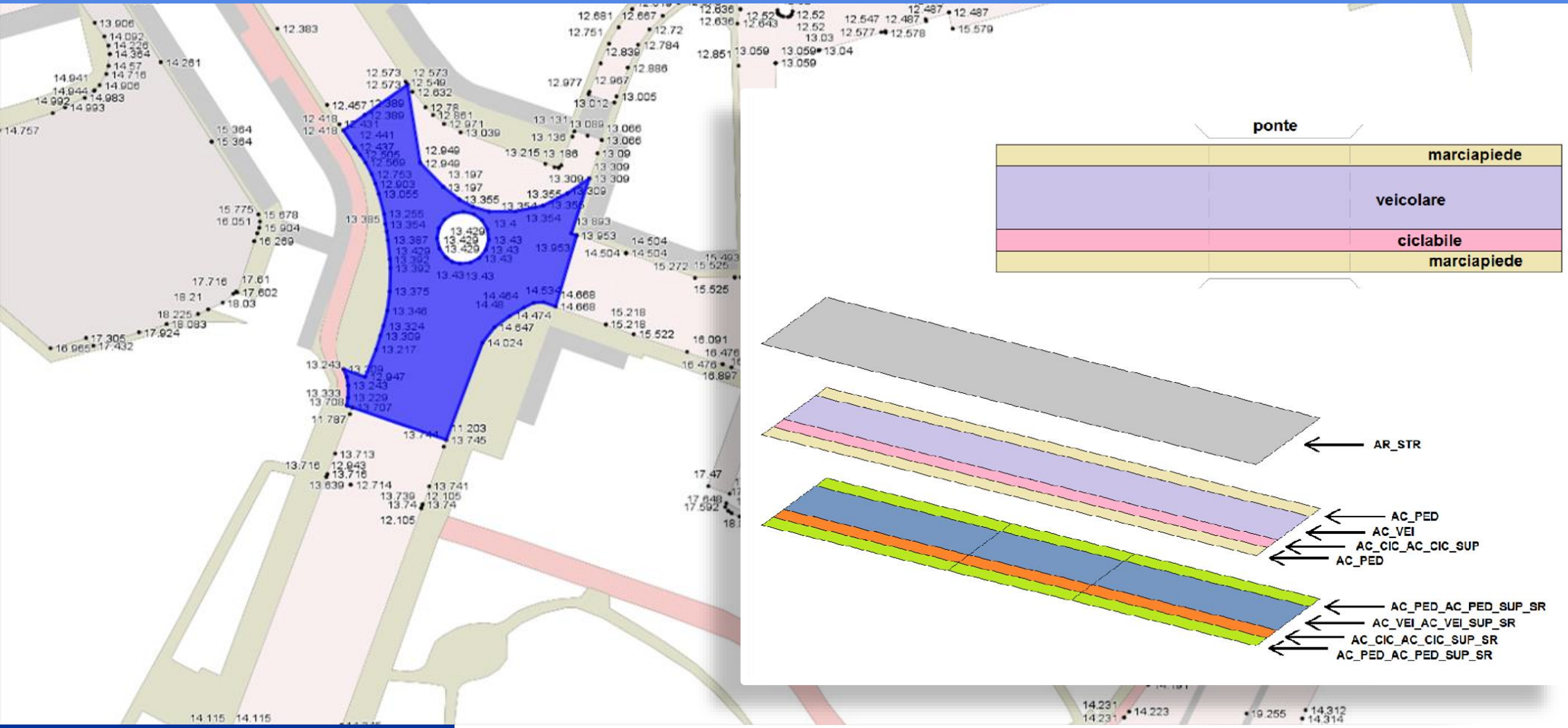
...Imagine all this in the city of Riga
...Just an example...



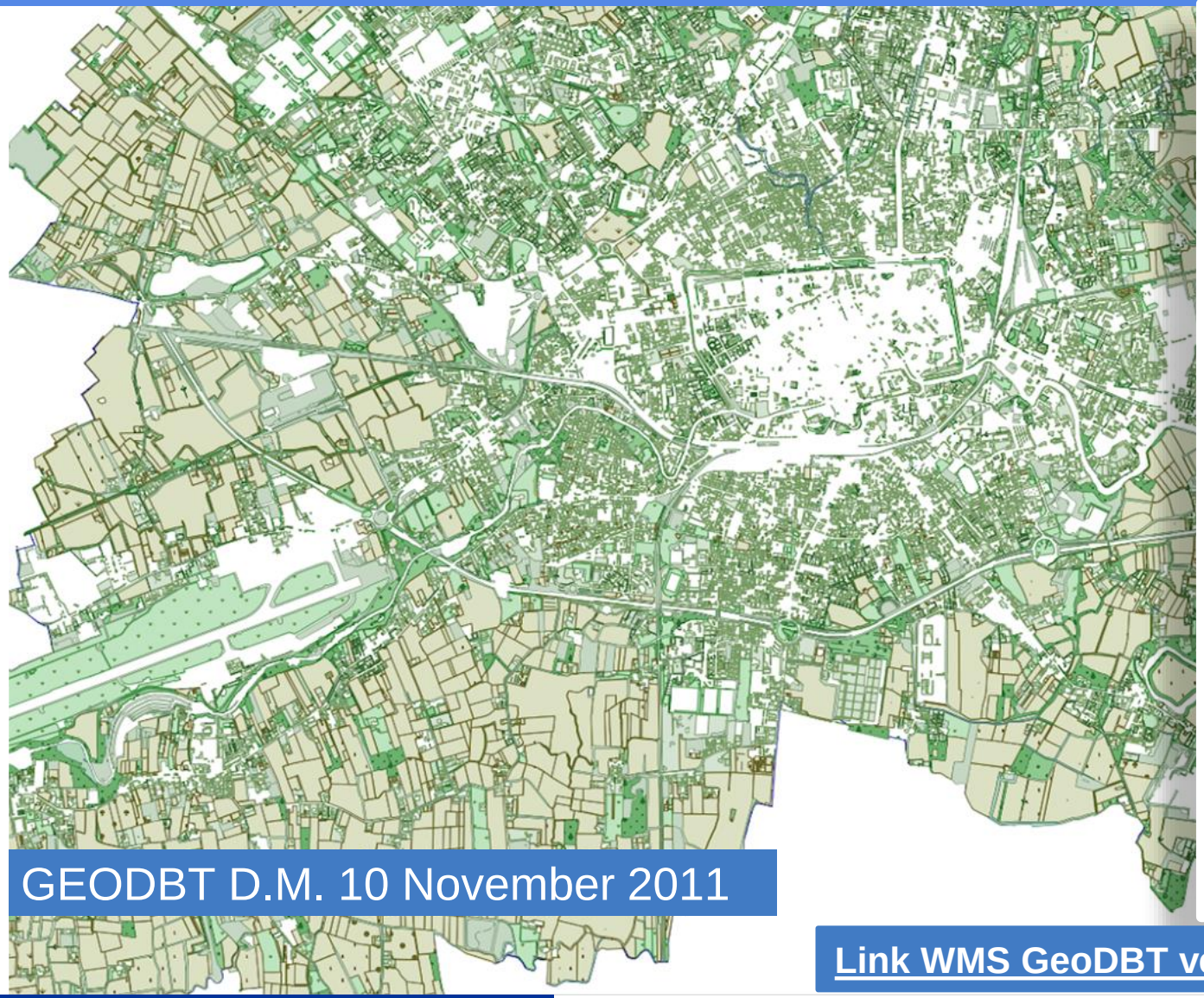


Analysis of the **Road system** and its features: cycle lanes, pavement/pedestrian lanes and vehicular lanes, with the characteristics: pavement, partial and total length and width

(GEODBT D.M. 10 November 2011 – INSPIRE)



Vegetation in the GeoDB and thematic maps with ground surveys of public green areas



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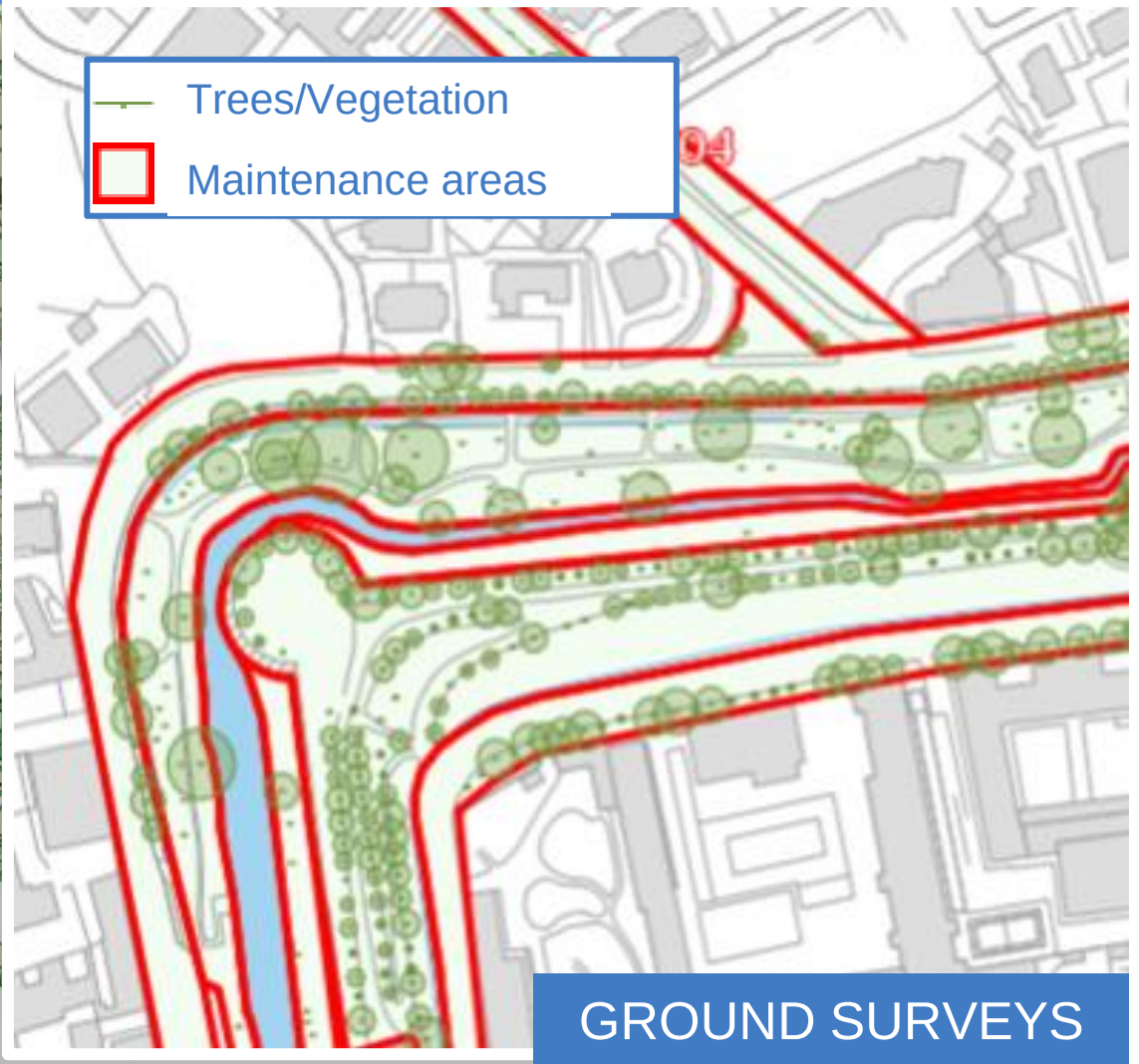


GROUND SURVEYS

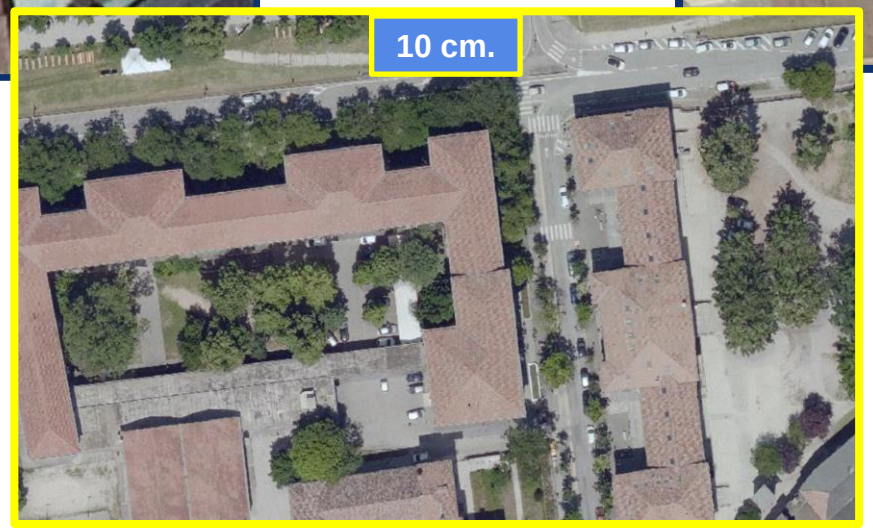
Link WMS GeoDBT vegetazione

Tomorrow, …Earth observation

What will be the future of the Municipality of Treviso?

Using geospatial technology but together with an integrated approach

- Urban monitoring and **mapping** using satellite images, with integration of aerial images for analysis at high scales (1:500, 1:1,000 - 1:2,000);

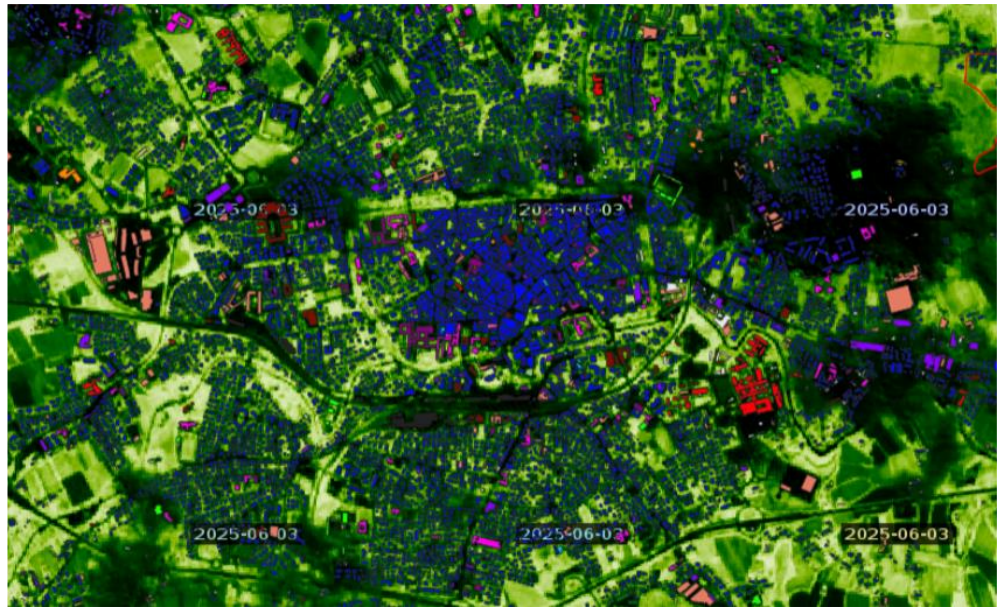


Tomorrow, …Earth observation

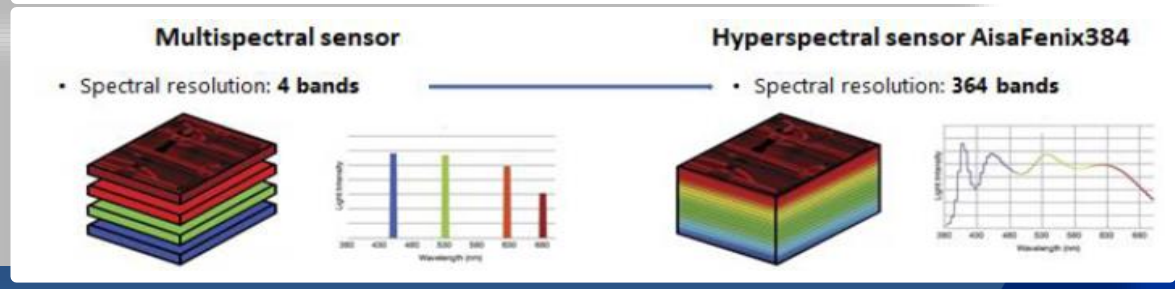
What will be the future of the Municipality of Treviso?

Using geospatial technology but together with an integrated approach

- Standard analysis using **multispectral satellite** imagery with analysis of vegetation indices such as NDVI -Normalised Difference Vegetation Index- analysis and other indices, and **advanced hyperspectral analysis,** for example tree species and surface material mapping using hyperspectral aerial imagery;



INDICE	INFORMAZIONE	APPLICAZIONE
NDVI		Presence of vegetation
MSI	Moisture Stress Index	Vegetation stress
NDWI		Water content in vegetation
CAI	Dried plant material	Vegetation senescence
LCI	Leaf Chlorophyll Index	Chlorophyll content
NDNI	Nitrogen Index	Analysis
		…



Tomorrow, …Earth observation

…and more for the future

- Use of the recently realised three-dimensional (3D) model of the city of Treviso;
- Digital survey of urban areas with automatic detection of objects (lampposts, pavements, vertical and ground signs,…);

…To conclude
to achieve greater sustainability of the city and the territory, we must:

- **Assess the threshold: What level of spatial accuracy is "good enough" for urban mapping?** How do different spatial resolutions affect the accuracy of management analyses, and which analyses remain effective? Improve the quality and accuracy of territorial data at the municipal level (scale 1:500, 1:1,000 and 1:2,000) with an open approach, integrating the use of satellite images with aerial and ground surveys and other sensors (laser scanners, oblique, thermal and hyperspectral cameras, etc....);
- Assess the potential of **Machine Learning algorithms** for Geo-Topographic DataBase update using satellite or aerial images;
- Investigate other data sources (thermal imagery) for UHI analysis - **Urban Heat Islands;**
- Assess the potential of **artificial intelligence techniques** to identify correlations between information extracted from different datasets;
- **Build models and integrated systems to support decision-making**, by providing data and/or maps which are easy to use for administrators and based on intuitive visualisations;
- **Continue to promote digital skills**: empower citizens towards better land management.

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CITTA' DI TREVISO

Municipality of Treviso

THANK YOU FOR YOUR TIME

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