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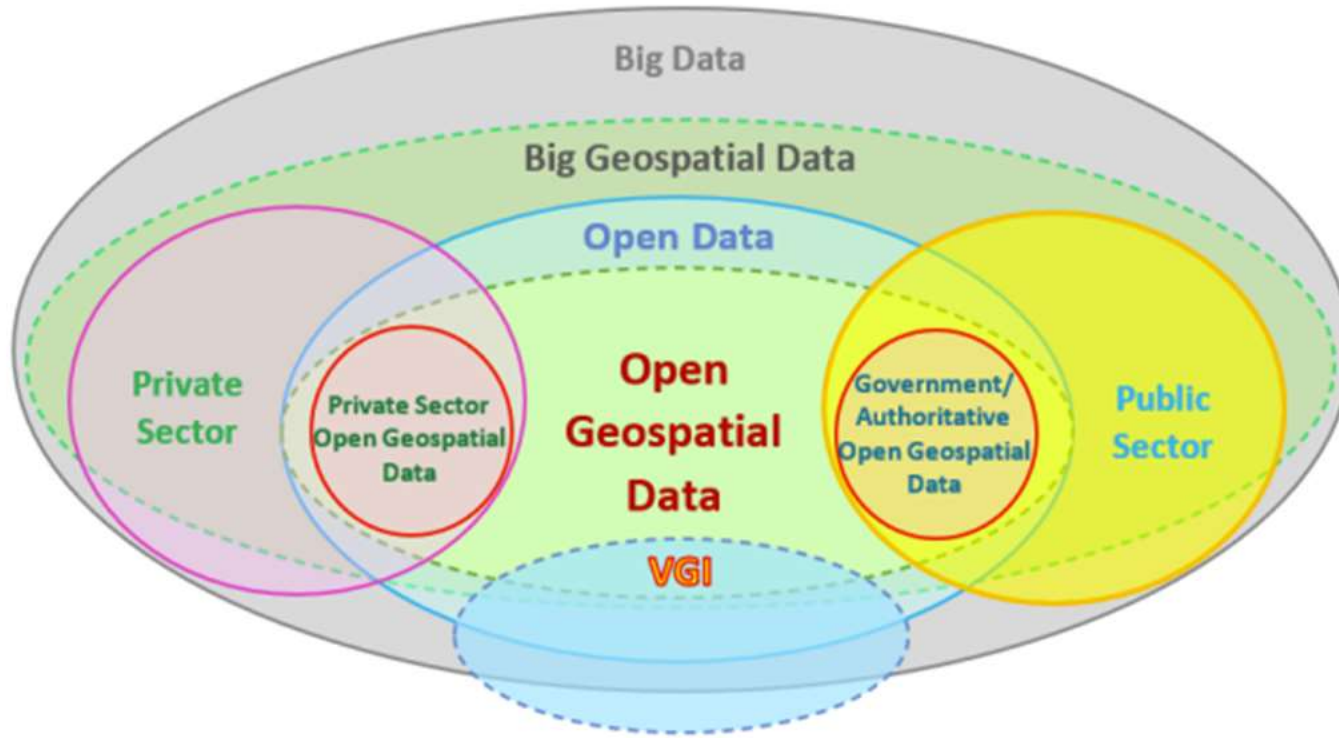
Purpose

- highlighting the importance of legislative provisions of open data - Romania

- short review of several open data sources – authoritative

- emphasizing the importance of urban open data for sustainable cities

National mapping and cadastral agencies - 'authoritative' geospatial data / created from authoritative sources.

Authoritative data contain a surveyor's professional stamp and that can be used for purposes such as engineering design, determination of property boundaries, and permit applications, the term carrying a **certification of positional accuracy**. (https://geoawesomeness.com/)

Volunteered geographic information (VGI) is the harnessing of tools to create, assemble, and disseminate geographic data provided voluntarily by individuals. (https://en.wikipedia.org/)

Open data, i.e., freely accessible, shareable, and usable data

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Current Situation

- surveyors are in the midst of a wave of geo-information and face the challenge of providing **reliable, adequate and accessible geospatial information, tools and services** in a timely manner to support all *17 Sustainable Development Goals (SDGs)* and the *169 of Agenda 2030 targets*;

- **the update process of geospatial data and Spatial Data Infrastructures (SDIs)** could now shift to be **event-based** instead a cyclical-time based, as in authoritative data;

- a particular interest in involving **volunteers for crowdsourced information** in developed countries and it is being analyzed the identification of possibilities to integrate VGI data into authoritative databases because traditional surveying methods for updating old maps are costly and require time;

FIG REPORT

FIG PUBLICATION NO.73

New Trends in Geospatial Information:
**The Land Surveyors Role
in the Era of Crowdsourcing and VGI**

CURRENT STATE AND PRACTICES WITHIN
THE LAND SURVEYING, MAPPING AND GEO-SCIENCE COMMUNITIES
FIG Commission 3

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Main Challenges

- **Data Quality** - OGC/ISO/W3C standards that help define a common framework for geospatial data, leading to the creation of a common platform of information exchange and the generation of added value - Quality of geospatial data from an ISO perspective involves ISO 19157 and EN ISO 19101 standards (Data Quality: Geospatial Data Quality – Basic concepts (no date). Available at: https://www.geo-train.eu/mod/page/view.php?id=66) - **Data Quality** needs to be assured by correlation with the intended purpose

- **Legislative Provisions** - a first step is the legislative harmonization that makes possible implementing open data initiatives

- the **pressure on public institutions**, which will be generated by the requests for access to open data

- public institutions are encouraged to produce and make available documents in accordance with the principle of 'openness by design and by default', public entities must make the dynamic data they hold available to potential users for re-use, immediately after collection, by means of appropriate APIs and where appropriate, by mass unloading. A critical element will be the **updating of data**, a resource-consuming activity.

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THE GREEN PAPER ON THE TRANSITION TO OPEN SCIENCE (2022 – 2030)

- AUGUST 2022
- Developed by Executive Unit for the Financing of Higher Education, Research, Development and Innovation (UEFISCDI)

CARTEA VERDE A TRANZIȚIEI CĂTRE ȘTIINȚA DESCHISĂ

(2022-2030)

Document strategic privind

Cadrul Dezvoltării

Științei Deschise în România

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Romania: Legislative Improvement on Open Data - "Law on open data and re-use of public sector information", approved by the Romanian Government

- to organize **the way of working on open data**, the public entities having the obligation to make available the data held

- to ensure **the conditions for easy access to the documents available for re-use**, such as by publishing data inventory lists, together with relevant **metadata**, accessible, online and in machine-readable formats, as well as to facilitate access to portal sites with links to resource lists

- **To transpose the DIRECTIVE (EU) 2019/1024** OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on open data and the reuse of public sector information and replaces Law no. 109/2007 on the reuse of public sector information.

Published: 14 June 2022 in Official Gazette no. 577

Romania: Extract from data related to geospatial domain and localities, with impact for the creation of sustainable urban areas

Geospatial domain:	data on coordinate reference systems;
	data on national and local georeferenced maps: administrative limits, delimitation of electoral districts, cadastral, topographical, marine plots, vectorized representations of roads (boulevards, streets, entrances, etc.), geospatial localization of addresses;
	data on administrative-territorial units;
	address data, location of properties, based on address identifiers, street name, administrative number and postal code;
	data on the geospatial location of the buildings, as well as their destination (e.g. city hall, high school, general school, etc.);
	data on the map of industrial and logistic objectives, production capacities with specification of the industrial category, warehouses with destination specification;
	data on the building permits map and demolition permits map, as well as their number at the level of administrative-territorial unit;
	data on road, naval, rail, aeronautical, electricity, gas, oil, primary, secondary, tertiary networks, charging stations for electric cars, coverage rate per locality, fiber optic communications, GSM, etc., water supply and sewerage, public lighting, traffic cameras and fixed radars;
	data on public emergency services, firefighters, ambulance, police;
	data on units for the dissemination or use of statistical information.

Romania: Extract from data related to geospatial domain and localities, with impact for the creation of sustainable urban areas

LOCALITIES

data on the administrative organization at county level, administrative-territorial units - municipalities, cities, communes;

data on urbanism and spatial planning documentations approved at the level of territorial administrative unit and at county level.

EARTH OBSERVATION FIELD AND ENVIRONMENT

land use data, a territory characterised by the current or future planned functional size or socio-economic, residential, industrial, commercial, agricultural, forestry, recreational purpose;

satellite and in-situ data, weather and quality monitoring of the earth, water and air - nitrogen dioxide, PM2.5, PM10, seismicity, energy consumption, energy performance of buildings;

data on public utility and public service services, public utility facilities such as sewage systems, waste management, electricity and water supply, and public administrative and social services such as civil protection shelters, schools and hospitals;

data on land cover, physical and biological coverage of the earth's surface, including artificial areas, agricultural areas, forests, (semi-)natural areas, wetlands and bodies of water;

data on the areas of administration, restriction, regulation and reporting units (landfills, restricted areas near drinking water sources, nitrate vulnerable zones, regulated fairways at sea or in major inland waters, areas intended for the unloading of waste, areas where noise limits have been introduced, areas covered by a prospection and mining permit, river basin districts, corresponding reporting units and coastal management areas);

soil and subsoil data, characterised by depth, texture, structure and content of particles and organic material, skeleton, erosion, medium inclination and anticipated water storage capacity, where relevant;

data on the geographical distribution of dominant pathologies (allergies, cancers, respiratory diseases, etc.) as well as information indicating the effect on health, biological indicators, decreased fertility, epidemics or on human well-being (fatigue, stress, etc.), directly related (air pollution, chemicals, thinning of the ozone layer, noise, etc.) or indirectly (food, genetically modified organisms, etc.) to the quality of the environment;

EARTH OBSERVATION FIELD AND ENVIRONMENT

data on natural risk areas, vulnerable areas characterised by natural phenomena of atmospheric, hydrological, seismic, volcanic nature, fires, floods, landslides and subsidences, avalanches, forest fires, earthquakes and volcanic eruptions;

data on digital elevation/elevation patterns of terrestrial, ice or oceanic surfaces, altimetry, bathymetry and coastline;

data on energy resources, hydrocarbons, hydraulic energy, bioenergy, solar energy, wind energy, accompanied by information on the depth and height of the resource;

data on mineral resources, metal ores, industrial ores, accompanied by information on the depth/height at which they are located, where appropriate;

data on the location and operation of environmental monitoring facilities, the observation and measurement of emissions, the state of the environment and other ecosystem parameters, biodiversity, ecological conditions of vegetation, etc., by or on behalf of public authorities;

data on production and industrial plants, industrial production parks, including integrated pollution prevention and control facilities, as well as water abstraction, mining and storage facilities;

structured data underlying monthly reports on waste charging and recycling, value, responsibility, source, tonnage;

structured data that are the basis of the annual statistical reports on the coverage with electricity or alternative energy by county / locality.
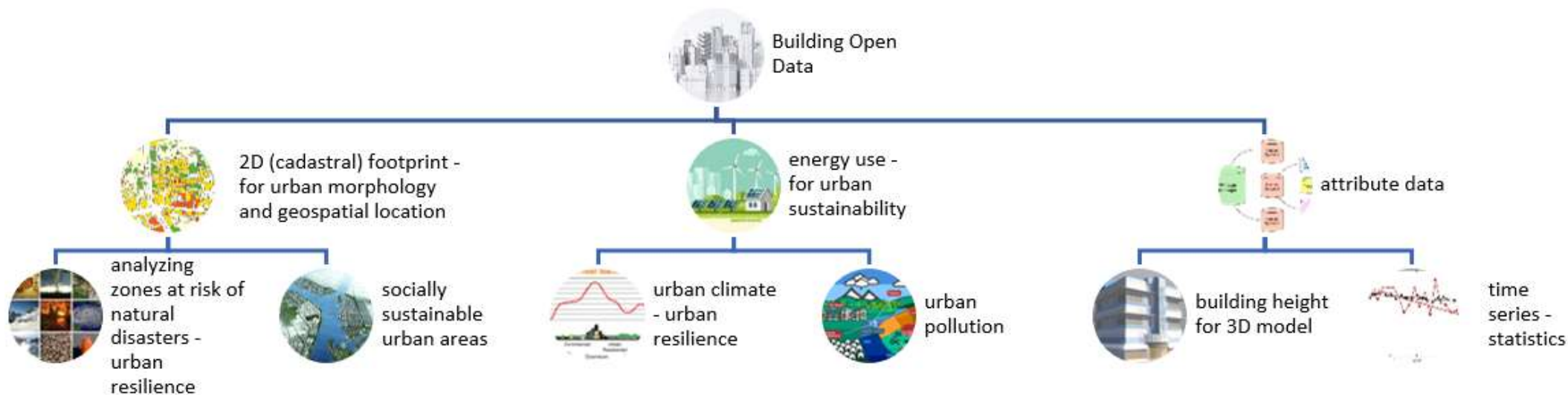
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Relevant Sustainability Impacting Indicators of Cities

Indicators

- ■ 11.1.1 (Housing)
- ■ 11.2.1 (Transport)
- ■ 11.3.1 (Urbanization)
- ■ 11.6.2 (Air Quality)
- ■ 11.7.1 (Open Space)

(Kavvada, A. et al., 2022)

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Example - Importance of Building Data in Urban Sustainability

(adapted from Biljecki, F. et al. 2021)

The data regarding the urban footprint and constructions represent only a first step towards the sustainable development of the cities, based on which correlations can be made with the applications that provide environmental attributes of cities.

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Open Geospatial Data and Tools – Examples (1)

- NASA provides open data and tools such as **ready-to-use resources**, that could be applied in policy areas important to resilient and sustainable cities, like sustainable urban planning, adequate housing, access to public transport, and access to public spaces – accessed by Application Programming Interfaces (APIs). **Earth Observation (EO)** data provide significant cost and time savings in urban monitoring and indicator measurement, particularly over large areas or areas where little data is available.

- Esri promotes the concept of open data, lately making accessible a series of open datasets - *Sentinel-2 10-Meter Land Use/Land Cover App, provides an annual 10-meter resolution map of Earth's land surface from 2017-2021*

- Urban Expansion (Stefanestii de Jos) – Esri App Data (2017 – left side, 2021- right side)

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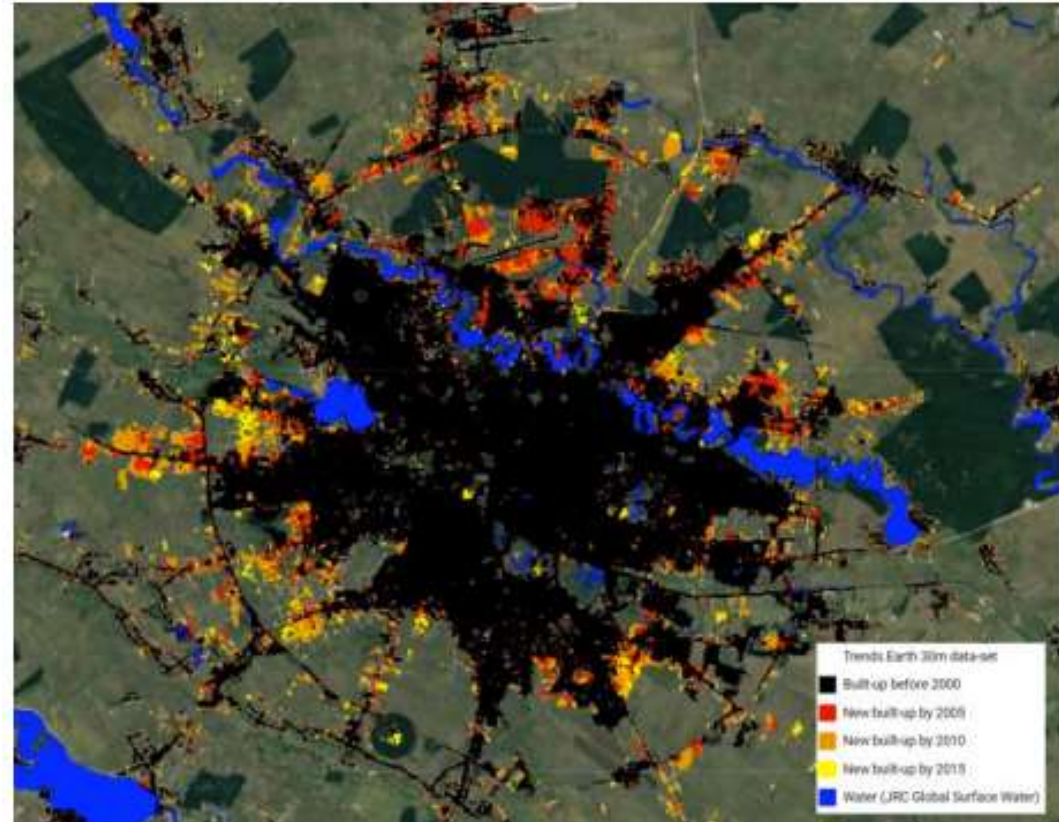Geospatial excellence
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Open Geospatial Data and Tools – Examples (2)

- Esri promotes the concept of open data, lately making accessible a series of open datasets - *Sentinel-2 10-Meter Land Use/Land Cover App, provides an annual 10-meter resolution map of Earth's land surface from 2017-2021*

- Urban Expansion (SouthEast Area of Bucharest) - Esri App Data (2017 – left side, 2021- right side)
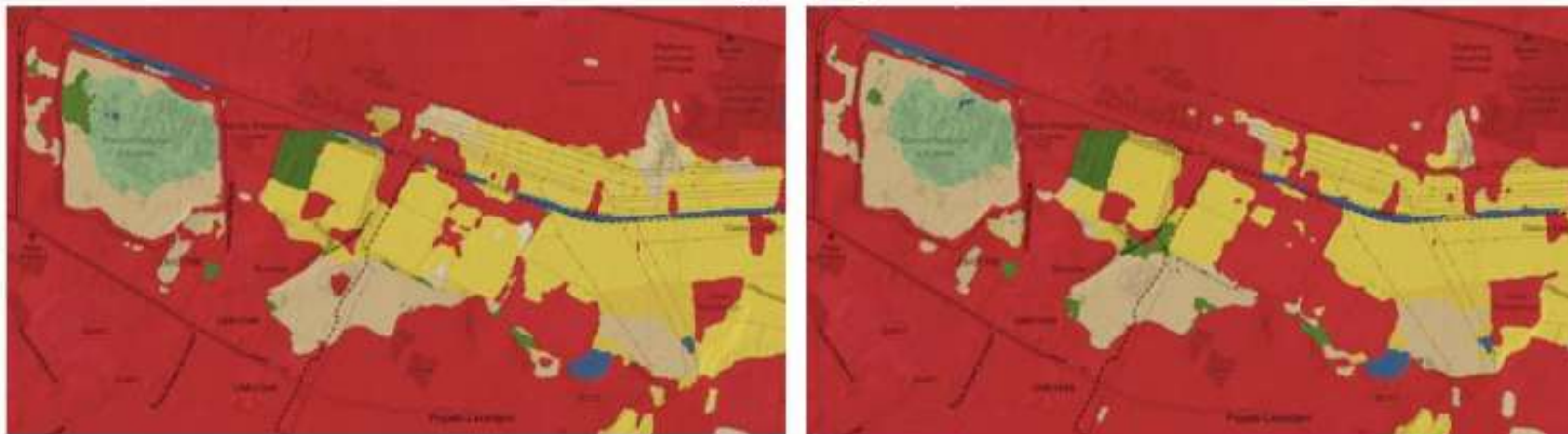
Open Geospatial Data and Tools – Examples (3)

- Trends.Earth is using three sub-indicators for monitoring achievement of Land Degradation Neutrality (LDN, Sustainable Development Goal (SDG) Target 15.3): productivity, land cover, and soil organic carbon - Urban Expansion (Bucharest) Trends.Earth 30m Dataset

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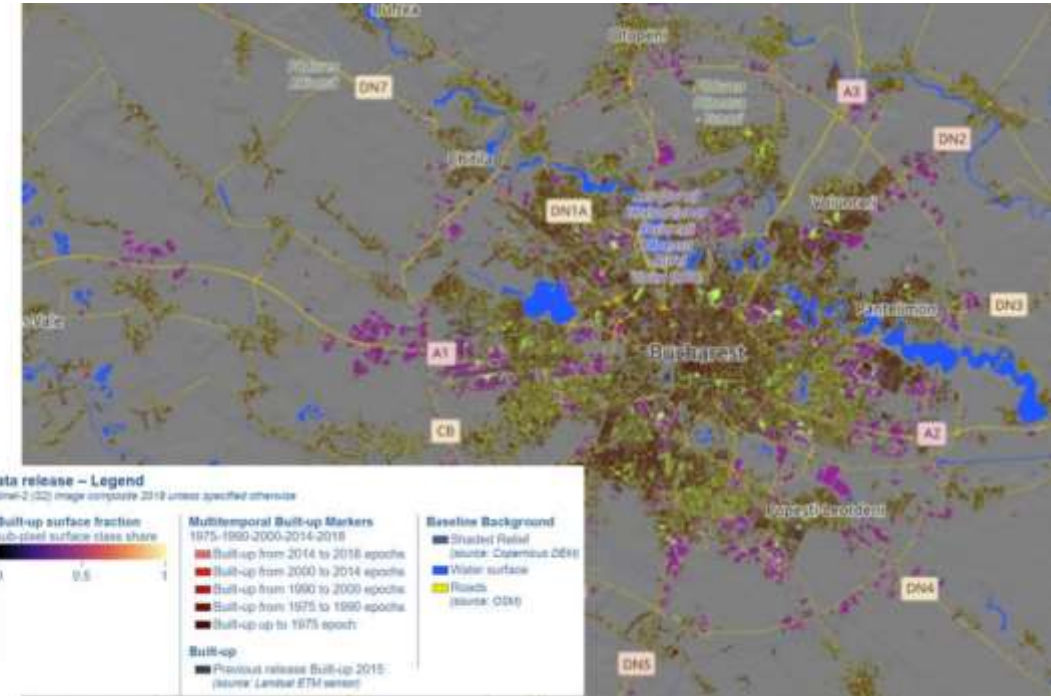Geospatial excellence
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Open Geospatial Data and Tools – Examples (4)

- **UN-Habitat** has developed a toolkit based on which open data are accessible for analysis and downloading, thus integrating available resources in several geoportals (e.g. Copernicus, EROS)

- Copernicus Land Monitoring Service (**CLMS**) is providing geospatial information on land use land cover (LULC) and its changes, vegetation state, water cycle and earth surface energy variables in Europe and in the whole world. There are developed four thematic High-Resolution Layers (HRL) on land cover characteristics for 39 countries of Europe at 10m spatial resolution.

- The **GHSL (Global Human Settlements Layer)** datasets that are available for open and free download: the data can be downloaded for each product in a single file or split by tiles. The produced built-up map is delivered at 2 m pixel resolution (level 1 layer) while the residential/non-residential layer (level 2) is delivered at 10 m spatial resolution.

- The **European Settlement Map** is a spatial raster dataset that is mapping human settlements in Europe based on Copernicus Very High Resolution optical coverage (2m) for year 2015 for 39 European countries.

Open Geospatial Data and Tools – Examples (5) – Exploring the European Settlement Map Data in ArcGIS Pro (South Area of Bucharest)

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Open Geospatial Data and Tools – Examples (6) – Global built-up areas (Bucharest) relies on novel classification methods applied for joint assessment of Sentinel Multi Spectral Instrument (MSI), Landsat Enhanced Thematic Mapper (ETM), Thematic Mapper (TM), and Multi Spectral System (MSS) remotely sensed imagery data organized in five collections: 2018, 2014, 2000, 1990, and 1975

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Open Geospatial Data and Tools – Examples (7) – Impervious Built-up 2018 in Bucharest in ArcGIS Pro, based on Copernicus Data – Basemap: OpenStreetMap (left side) - Overlapped on information layer on probability of built-up area presence as derived from a Sentinel-2 image mosaic (right side)
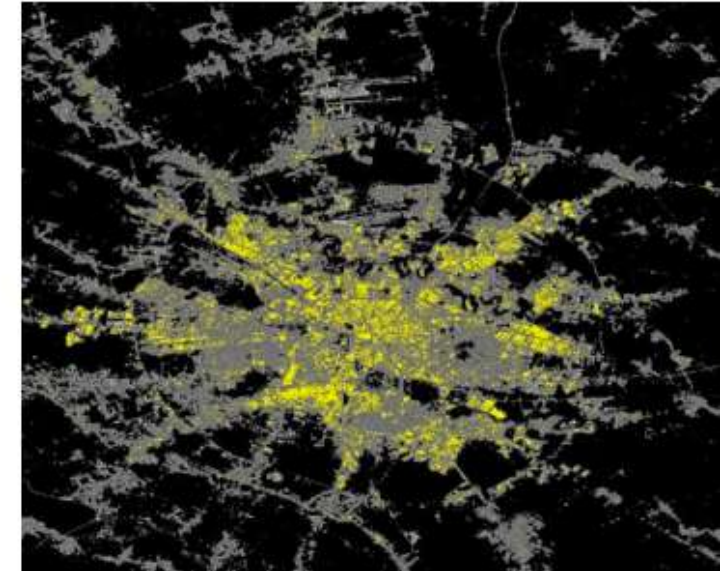
Open Geospatial Data: GODI for Romania

- Global Open Data Index (GODI), the annual global benchmark for publication of open government data, run by the Open Knowledge Network

Open Geospatial Data: Available Sources in Romania – Example: authoritative geoportals

- data available to download and/or using services
- https://data.gov.ro/
- https://geoportal.ancpi.ro/
- http://geoportal.gov.ro/

QUALITY, VERIFIED, RELIABLE

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Open Geospatial Data: Available Sources in Romania – Example: The Territorial Observatory

QUALITY, VERIFIED, RELIABLE

- The Territorial Observatory is a geoportal developed through a project of the Ministry of Development, Public Works and Administration (MDLPA) together with Esri Romania;

- data analysis in territorial profile and quantifications of the territorial impact of public programs in the field of spatial planning, urbanism, housing and regional development, which is **exactly what would be needed at present, in the context of PNRR (the national recovery and resilience plan)** and **sustainable urban development**;

- downloading the data, in Esri Gdb or MS Excel xls format;

- data integrated in the geoportal: geographical elements and administrative organization, demography and population, housing, intrastructure and social services, economic development, spatial planning and urban planning.

Open Geospatial Data: Available Sources in Romania – Example: Availability of General Urban Plan in Territorial Observatory Geoportal – authoritative data

Open Geospatial Data: Available Sources in Romania – Example: VGI Data

- https://inspectorulpadurii.ro/#/

- THE FOREST INSPECTOR is a tool for questioning the legality at the disposal of any citizen who wants to get involved in monitoring the exploitation of forests and the transport of wood material.

- It is a mobile application, which can be installed by any person on their personal mobile phone.

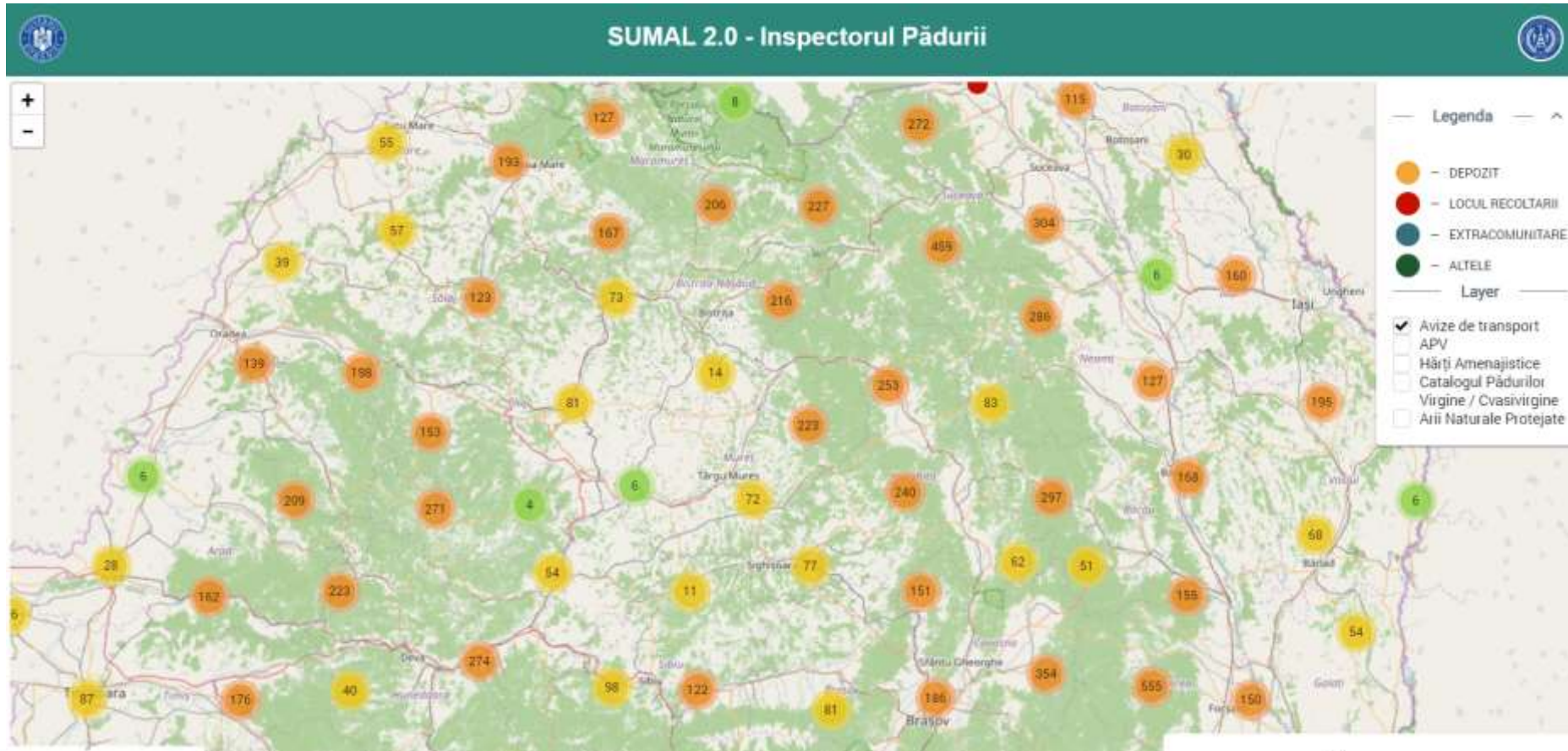Store and includes the following:

Query:

- 1. the number of the vehicle transporting wood material.

Query Response:

- 2. the existence/non-existence of the unique transport code in the last 72 hours;

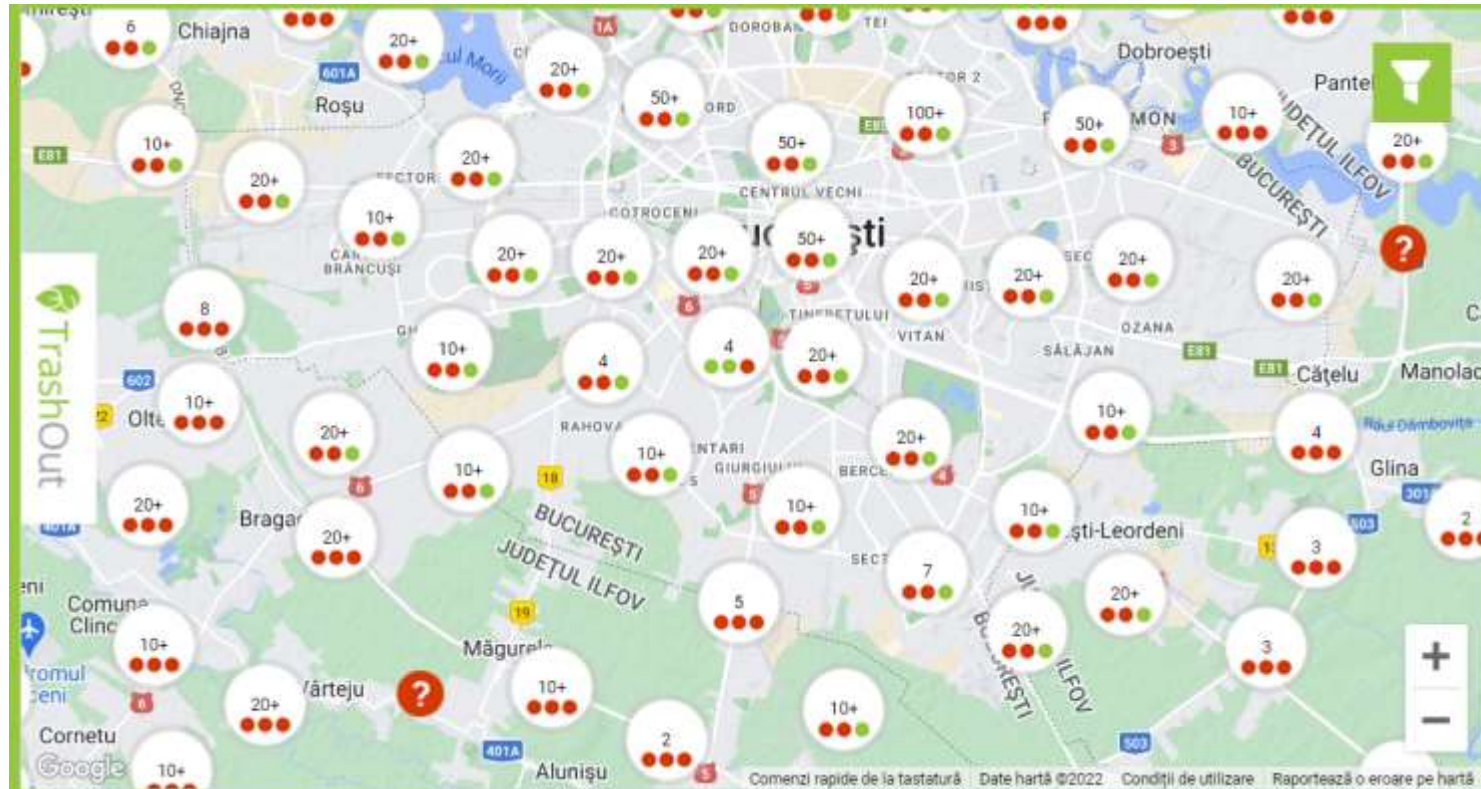- 3. the date, hour, minute and second of the generation of the unique transport code.

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Open Geospatial Data: Available Sources in Romania – Example: VGI Data

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Open Geospatial Data: Available Sources in Romania – Example: VGI Data

- https://www.trashout.ngo/

- TrashOut is an application through which any citizen can upload a picture and a GPS location of the garbage bag thrown on the side of the ditch.

- It reaches a centralizer, a check is made by the volunteers who work for this system, a notification reaches the City Hall and the Environmental Guard.

- If the City Hall does not do greening, the Environmental Guard comes and can apply the fine.

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Open Geospatial Data: Available Sources in Romania – Example: VGI Data

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Conclusions

- the advantages of providing specific high-value open datasets are to generate important **socioeconomic or environmental benefits** and innovative services for a large number of users, especially SMEs, to help generate revenue and to be combined with other datasets.

- a good example of a successful project of Romania is in this respect the Territorial Observatory. This is an application coordinated by a ministry that coordinates capacity-building assistance and compiles and analyzes urban indicator data to assess national trends and needs. **Local urban observatories are also mentioned by UN-Habitat** and are comprised of a consortium of local stakeholders coordinated by a municipal government office, university research center, community-based organization or private entity. The main recommendation would be that groups with complementary interests in an urban area to set up one observatory rather than replicate efforts. In fact, in Romania at city hall level there are cities that have developed geospatial data portals, but they only allow searching and not downloading.

- crowdsourcing and VGI **should not be seen being in competition** with authoritative efforts in Romania.

Conclusions

- another aspect for Romania is the **growing need for open geospatial data** and the **completion of the development of INSPIRE themes**, as well as the intensification of the efforts of publishing geospatial data on the datagov.ro portal. This data must be downloadable or used through the services.

- Gradually, the applications on the ANCPI geoportal will allow more and more the use of data.

- another implication of today's **open geospatial data and applications paradigm is reflected in training activities**, or rather in surveying competence for other disciplines. Thus, the expertise of land surveyors, seen as geospatial experts, should be changed towards *statistical issues, data and information analysis and management, knowledge on standards and data quality, accuracy assessment, designing specific informational systems for real estate security, development and management of data using WebApps*.

- The applications using **Earth Observation Data** are valuable tools for decision-makers as city mayors. These possibilities can improve understanding of land use planning, surface water, pollution and resource management planning, as well as the trends in the country's natural capital, which helps define land planning priorities correlated with the the budgetary resources.

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Conclusions

- There are **legislative initiatives** that support open data, therefore, they would need to be found in decisions at the local level.

- Initiating legislative changes regarding the availability of open geospatial data is a correct step in this regard, which will **lead to sustainable development**.

Thank you for your kind attention!