



## Valorisation of Digital Cadastral Data – Towards a More Sovereign, Effective, and Ecological European Model

Compilation of responses to the questionnaire that was carried out in preparation for the French PCC Conference jointly organized with the CLRKEN of EuroGeographics on 31<sup>st</sup> May and 1<sup>st</sup> June 2022 in Paris

The overall topic of the Joint PCC/CLRKEN Conference will be about the **"Valorisation of Digital Cadastral Data – Towards a More Sovereign, Effective and Ecological European Model"**.

In line with the European Green Deal and the past Slovenian Presidency, the French Presidency of the Council of the European Union has set itself the objective to promote a more united, more sovereign, more democratic and more innovative Europe; a Europe, which defends its interests and values, while moving the digital and ecological transition forward.

In the context of the French PCC Presidency, this means that we observe and keep an eye on our different cadastral systems and digital datasets, in order to learn from each other and to increase the quality, completeness, and correctness of the available documentation (location, including by address, identification, geo-referencing, topographical accuracy), interoperability and accessibility. With the multiplicity of data sources and formats, it has become possible to combine the data, to enhance the value of the data, to make better use of it, and to also control the flow of data.

In addition, the implementation and deployment of new management solutions and the improvement of existing tools such as digital platforms will require and advance the sharing and exchange of data between the cadastral database and other types of data. The digital transition also involves the development of innovative technologies to acquire a better knowledge of the territory in areas with urban, forestry, agricultural, ecological, and industrial issues. These new technologies also aim to automate the creation and updating of our cadastral data.

In order to guarantee the efficiency and relevance of cadastral data in the interaction with other data, cadastral authorities have and will have a crucial role in enhancing and adapting their own data for making them available within a broader geoinformation infrastructure. Such strategic concepts will help to valorise – i.e. to add value to – the cadastral data, and thus contributing to move forward towards a more sovereign, efficient and ecological European model.

The questionnaire was seeking input for the Joint PCC/CLRKEN Conference in Paris looking at these developments. We did get responses from 22 countries, with rich content in their

answers. This report is a compilation of all responses; a summary and analysis will be presented during the conference.

The questionnaire consisted of the following three parts:

Part 2.1 – Innovations in the Field of Cadastre: New Technology and Tools, and Improvement of its Management

Part 2.2 – Interoperability and Accessibility of Cadastral Data in interaction with Other Data (ecological, forestry, agricultural, urban, and industrial)

Part 2.3 – The Cadastre and its Contribution to a More Sovereign, Effective, and Ecological European Model.

## 1. Participating Countries: 22

| Country Code | Country Organization   | Name Email-address  |
|--------------|--|---|
| AT           | <b>Austria</b><br>BEV - Bundesamt für Eich- und Vermessungswesen   | Julius Ernst <julius.ernst@bev.gv.at>   |
| BE           | <b>Belgium</b><br>FPS Finance   Patrimonial Documentation  | Jolien Neckebroeck (MINFIN) <jolien.neckebroeck@minfin.fed.be>  |
| CH           | <b>Switzerland</b><br>Federal Office of Topography swisstopo   | Daniel Steudler <Daniel.Steudler@swisstopo.ch>  |
| CZ           | <b>Czech Republic</b><br>Czech Office for Surveying, Mapping and Cadastre  | Svatava Dokoupilova <Svatava.Dokoupilova@cuzk.cz>   |
| DE           | <b>Germany</b><br>Working Committee of the Surveying Authorities of the Laender of the Federal Republic of Germany | AdV-Geschäftsstelle (LDBV) <AdV.GS@ldbv.bayern.de>  |
| DK           | <b>Denmark</b><br>Geodatastyrelsen   | Pia Åbo Østergaard <piaoe@gst.dk>   |
| EE           | <b>Estonia</b><br>Maa-amet / Estonian Land Board   | Priit Kuus <priit.kuus@maaamet.ee>  |
| ES           | <b>Spain</b><br>Dirección General del Catastro   | Amalia Velasco <amalia.velasco@catastro.hacienda.gob.es>  |
| FI           | <b>Finland</b><br>National Land Survey   | Halme Pekka <pekka.halme@maanmittauslaitos.fi>  |
| FR           | <b>France</b><br>DGFIP: Direction générale des Finances publiques  | martine.caussanel <martine.caussanel@dgfip.finances.gouv.fr>  |
| GR           | <b>Greece</b><br>Hellenic Cadastre   | Stathakis Dimitrios <dstathak@ktimatologio.gr>  |
| HR           | <b>Croatia</b><br>Državna geodetska uprava   | Zekušić Sanja <Sanja.Zekusic@dgu.hr>  |
| IT           | <b>Italy</b><br>Revenue Agency - Central Directorate for Cadastral, Cartographic and Land Registration Services    | Central Directorate for Cadastral, Cartographic and Land Registration Services <dc.sccpi@agenziaentrate.it> |
| LT           | <b>Lithuania</b><br>State Enterprise Centre of Registers   | Bronislovas Mikūta <Bronislovas.Mikuta@registrucentras.lt>  |
| LV           | <b>Latvia</b><br>Valsts zemes dienests   | Vents Priedoliņš <pasts@vzd.gov.lv>   |
| NL           | <b>The Netherlands</b><br>Cadastre, Land Registry and Mapping Agency   | Martin Salzmann <Martin.Salzmann@kadaster.nl>   |
| PL           | <b>Poland</b><br>Head Office of Geodesy and Cartography (GUGiK)  | Katarzyna Ziębaczewska <Katarzyna.Ziebaczewska@gugik.gov.pl>  |
| PT           | <b>Portugal</b><br>Direção-Geral do Território   | Paulo Agostinho Torrinha <ptorrinha@dgterritorio.pt>  |

|    |  |  |
|----|--|--|
| RO | <b>Romania</b><br>National Agency for Cadastre and Land Registration | Adriana Poggi <adriana.poggi@an-cpi.ro>                      |
| SE | <b>Sweden</b><br>Lantmäteriet  | Magdalena Andersson <Magdalena.Andersson@lm.se>              |
| SI | <b>Slovenia</b><br>Surveying and Mapping Authority                   | Franc Ravnihar <Franc.Ravnihar@gov.si>                       |
| SK | <b>Slovakia</b><br>Surveying and Mapping Authority                   | Behuliaková Martina, Ing. <martina.behuliakova@skgeodesy.sk> |

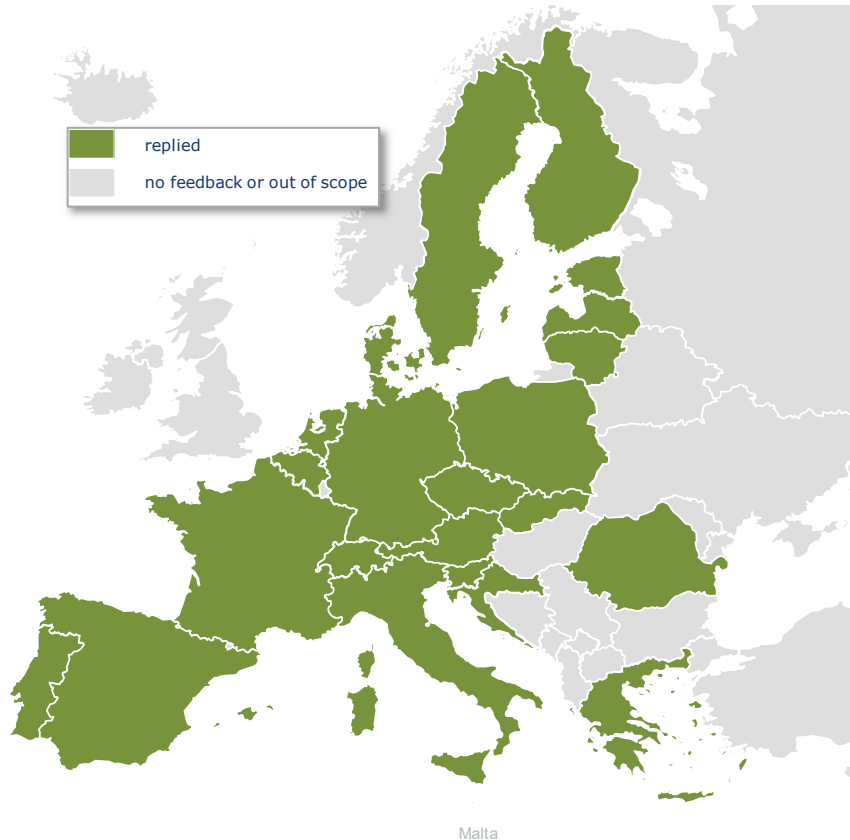


Figure 1: The 22 participating countries.

## 2. Valorisation of Digital Cadastral Data

The digital transition involves the use of innovative technologies to acquire a better knowledge of the land in terms of urban, forestry, agricultural, ecological, and industrial issues. New technologies will also impact on the automated creation and updating of cadastral data.

In order to guarantee the efficiency and relevance of cadastral data in the interaction with other data, cadastral authorities have and will have a crucial role in enhancing and adapting their own data for making them available within a broader geoinformation infrastructure. Such strategic concepts will help to valorise – i.e. to add value to – the cadastral data, and thus contributing to move forward towards a more sovereign, efficient and ecological European model.

### 2.1 Innovations in the Field of Cadastre: New Technology and Tools, and Improvement of its Management

New technologies such as LiDAR, AI, robotic Systems, digital technology supply chain, telemetry technology, 3D reconstruction of environments, etc. are new ways to improve our cadastral systems and datasets in various fields (cadastral parcels, buildings, natural

areas, forestry and agricultural uses, ground elevation description, risk mapping, modeling of topographic changes, ...).

**Q2) Do you have any examples for the use of new technologies in your cadastral systems or datasets?**

| Q2) | Description of Examples  |
|-----|--|
| AT  | <ul style="list-style-type: none"> <li>to update the building layer of the Cadastral Map, we use information from the Digital Terrain Model and from Digital Landscape model; these systems use LIDAR information as well as topographic information derived by Digital Orthophotos;</li> <li>to detect areas with ground movement to present these areas in the Cadastre we use different sources from risk management and geological data from the competent authorities.</li> </ul>   |
| BE  | Mathematical valuation models for determining real property value; at the moment used for risk management and tax audits, later for the valuation system of all real property in Belgium.  |
| CH  | <p>From a conceptual point of view:</p> <ul style="list-style-type: none"> <li>exploration of BIM possibilities and cooperation in BIM initiatives</li> <li>register of buildings</li> <li>documentation of underground facilities to be introduced in the coming years</li> <li>cadastre and the land registries are jointly trying to establish a common information system in order to provide a more efficient and effective service to users</li> </ul> <p>From a technical point of view:</p> <ul style="list-style-type: none"> <li>digital orthophoto imagery</li> <li>use of LiDAR for height and change detection</li> </ul>   |
| CZ  | <ul style="list-style-type: none"> <li>In cadastral mapping, new methods (AI, LIDAR etc.) are currently unusable, because for us the basic activity is securing the parcel boundaries with the participation of the owner, and the subject of surveying is the subsequently marked and agreed boundary in the field. The only innovation is parallel securing and surveying of the boundary – some pilots have already taken place – in the future, this could be robotized.</li> <li>Automated taking over of some special-purpose territorial features (such as mining or nature protection areas from the basic state Register of territorial identification, addresses and real estate (RÚIAN).</li> <li>Automated download of data from the Information system of the insolvency register (ISIR) – now in pilot phase</li> <li>The IS of real estate cadastre is linked to the system of basic state registers from which it retrieves information on individuals, companies and addresses.</li> <li>Data from aerial photographs are used as the basis for depiction of cadastral maps.</li> </ul> |
| DE  | <ul style="list-style-type: none"> <li><b>Copernicus:</b> Radar (SaarBoBeKa: <a href="https://geoportal.saarland.de/article/Bodenbewegungskataster/">https://geoportal.saarland.de/article/Bodenbewegungskataster/</a>), KI4Forst (<a href="https://www.schleswig-holstein.de/DE/Landesregierung/LVERMGEOISH/Themen/themaCopern/geodatenCopernicusKi4Forst.html">https://www.schleswig-holstein.de/DE/Landesregierung/LVERMGEOISH/Themen/themaCopern/geodatenCopernicusKi4Forst.html</a>), Cop4All</li> <li><b>LIDAR:</b> 3D – Building models, DTM</li> <li><b>Change detection</b></li> <li>(First experimental and production results are too many to fill in here.)</li> </ul>   |
| DK  | ---  |
| EE  | Estonian cadastre are developing using AI services like Texta and Chatpot ( <a href="https://en.kratid.ee/kratijupid">https://en.kratid.ee/kratijupid</a> ). Base map layer are produced using LIDAR technologies.   |
| ES  | <ul style="list-style-type: none"> <li>The use of LIDAR that allows us to obtain models of the terrain, surface, elevations that improve the visualization and correction of the Cadastral cartography. It also serves to enrich the BD with altitude and with slope at least in rural cadastre.</li> </ul>  |

| Q2) | Description of Examples  |
|-----|--|
|     | <p>We have a project to obtain real height data of buildings from LiDAR data. The cadastral database has information about the buildings and their height but defined as the number of floors. The LiDAR data have allowed to obtain in the project data of real height of buildings, allowing the generation of more real models of them.</p> <ul style="list-style-type: none"> <li>• Also we use LiDAR and other technics (and in the future IA) to detect new constructions or extensions.</li> <li>• Other example of new technologies is 3D modeling with GeoJson models, 3d threejs libraries, and Python developments.</li> <li>• Another example is improving simplicity in downloading literal information with CSV formats.</li> <li>• We also use new technologies for the setting of cadastral values, both in market studies of urban real estate, and in the calculation of the productive potential in agricultural and forestry real estate.</li> <li>• We try to improve and facilitate the relationship of the citizen with the cadastre adding to traditional communication channels (face-to-face, telephone and through the virtual office), videoconferencing.</li> </ul> |
| FI  | <p>Improvement of the location data of boundary mark information:</p> <ul style="list-style-type: none"> <li>• The first fact finding project started on Nov 16, 2020</li> <li>• Crowd-sourcing-based service was available to citizens in the summer of 2021.</li> <li>• More accurate location data was collected on unclear boundary marks by crowd-sourcing using mobile phones.</li> <li>• The service was www-based (not a separate downloadable application in the phone.</li> <li>• The map view showed the boundary marks, on which we wanted a more accurate location.</li> <li>• Ca 20,000 measurement results were received and the project was considered successful.</li> <li>• The next project started in early 2022. Its goal is to improve the accuracy from current 3 m to 1 m.</li> </ul>  |
| FR  | <p>AI as an experimental process: This process aims to guarantee a better reliability of local tax bases by using innovative technologies of artificial intelligence and data enhancement with the help of aerial photographs taken by the National Institute of Geographic and Forestry Information (IGN).</p> <p>This project has two objectives:</p> <ul style="list-style-type: none"> <li>• it aims, by optimizing the process of detection of constructions or developments, to allow to fight more effectively against the declarative anomalies and thus better meet the wishes of equity and tax justice of citizens, by the fair taxation of goods;</li> <li>• it also offers the possibility to update the contours of buildings detected by the algorithms on the cadastral plan.</li> </ul>   |
| GR  | <p>We have used LIDAR to map coastal areas (a narrow buffer zone along the coastline) in order to delineate the zones of the foreshore and of the beach (the area covered by waves during the winter). The ownership of these two entities (foreshore and beach) is clarified by the delineation done.</p> <p>Some of our private contractors for the cadastral mapping have used drone technology to increase the mapping accuracy to a few centimetres and create DSMs (Digital Surface Models) that are used for 3D representations to aid property identification and ownership declaration by private owners. This detailed mapping has been applied to some Greek islands for example.</p>   |
| HR  | <p>The implementation of the project "Multi-Sensor Aerial Imaging of the Republic of Croatia for Disaster Risk Reduction Assessment" is underway. Based on the data obtained by LiDAR scanning, a digital terrain model (DTM) will be produced of higher accuracy, spatial resolution and reliability than the existing state DTM, which was made by using classical photogrammetric techniques. Data obtained by scanning will be analysed and used as bases for the preparation of disaster risk analyses, primarily earthquakes and</p>   |

| Q2) | Description of Examples  |
|-----|--|
|     | floods, as it has been established that the accuracy of produced models is directly dependent on the quality and accuracy of available spatial data.   |
| IT  | <p>Use of Lidar technology for boundaries survey in high mountain wide areas, difficult to access.</p> <p>Use of artificial intelligence for building identification from orthophotos and derivation of vector geometries for the cadastral cartography updating.</p> <p>Use of spatial analysis tools applied to cadastral cartography, integrated with information on buildings, for the delimitation of historical centres, aimed at supporting seismic risk reduction and emergency management activities.</p>   |
| LT  | <p>Digital technology supply chains: many electronic services developed by the State Enterprise Centre of Registers have been implemented and the customers use these services; transferring cadastral data collection and processing of real property objects as well as business processes to the electronic environment; electronic services for the submission of automated applications to register real property objects and rights to them; implementation of real property electronic transactions; mass valuation services, etc.</p> <p>Robotic systems: robotic solutions are used for separate repetitive parts of business processes.</p> <p>3D models: the State Enterprise Centre of Registers has implemented a project where technologies for the development of 3D models of real properties were developed and tested in a pilot area of one municipality.</p>   |
| LV  | <p>After comparing LiDAR data with the cadastre map, it was detected:</p> <ol style="list-style-type: none"> <li>1) buildings for which the contour position on the cadastre map is incorrect</li> <li>2) buildings with a contour on a cadastre map different from that in the area</li> <li>3) buildings that are in the area but not in the cadastre were found</li> <li>4) buildings that are in cadastre, but not in the area</li> </ol> <p>According to legal response, a cadastre map was arranged within the framework of the pilot project in some small areas in relation to buildings for which the contour position on the cadastre map was incorrect.</p> <p>A solution for both practical action and legislation will be sought in the forthcoming pilot project launched this year, so that the remaining mismatches can be sorted out.</p>   |
| NL  | <p>At the moment we pursue a number of innovations and improvements related to cadastral issues:</p> <ol style="list-style-type: none"> <li>1. We are piloting the integrated use for the registration of rights in relation to building information (BIM). In this way, we look for registering rights (properties, condominiums) in 3D, but also establish an explicit link to building information.</li> <li>2. We are upgrading our current cadastral (index) map to an authoritative cadastral boundary map. In the first phase, we have added quality information to all elements of our index map and in the next step, we will incorporate all cadastral measurement information into the cadastral map. Main benefits are direct and easier insight into the legal boundaries of properties, but at the same time the integration of cadastral information with large-scale topography and other geo-referenced data becomes very straightforward.</li> <li>3. We are piloting geometrically plotting servitudes as part of the cadastral registration. This gives much more insight to the actual use of properties, in addition to the rights, restrictions and responsibilities vested by the servitudes.</li> </ol> |
| PL  | ---  |
| PT  | <p>An automatic procedure for evaluating, classifying and identifying parcels constraints related with the fractionation of property for law application is being implemented, using artificial intelligence. This tool operates on the information present in the land occupation map (COS), and crossing it with cadastral parcels or user drawing areas, and with Land Use Regime Map (CRUS), National Agricultural Reserve (RAN) and return a decision support for parcel fractionation.</p>   |

| Q2) | Description of Examples  |
|-----|--|
|     | Also some initiatives on the use of Lidar in forest areas.   |
| RO  | <ul style="list-style-type: none"> <li>• <b>LiDAR</b>, we have already 50,000 sqkm covered with OP and numerical model of terrain, and for another 100,000 sqkm works are in progress,</li> <li>• <b>3D modelling</b> – we have elaborated the Technical Norms for receiving data from 3D scanning.</li> </ul>   |
| SE  | Interpretation of cadastral documents with the help of AI-technology. Pilot activity using crowdsourcing for capturing boundary marks. Automated decisions in land registration for renewal of specific rights.  |
| SI  | Generation of contour lines and elevation points from LIDAR data: Height model (DMR) from LIDAR data was used for generation of contour lines for scale 1:5,000. The appropriate level of generalization was achieved by smoothing DMR and then making contour lines from smoothed DMR. Elevation points were created with automated procedures based on various sources and minimal manual editing.   |
| SK  | <p>From 2019 new information system “Register of buildings” (IS Zoznam stavieb) in operation (register of buildings edited by the municipalities, register is centrally administered by Geodesy, Cartography and Cadastre Authority of the Slovak Republic, municipalities edit data related to building approval, new free of charge WMS service - WMS Zoznam stavieb, available on ZBGIS® portal and national Geoportal</p> <p>From 2021:</p> <ul style="list-style-type: none"> <li>• Vector cadastral map available as open data;</li> <li>• New products in responsibility field of Geodesy, Cartography and Cadastre Authority of the Slovak Republic;</li> <li>• new orthophotomosaics of the territory of western Slovakia from 2020 (2nd cycle of creation) is now available for download in the RGB color variant;</li> <li>• new Digital relief model (DMR 5.0) – from aerial laser scanning</li> </ul> |

## 2.2 Interoperability and Accessibility of Cadastral Data in interaction with Other Data (ecological, forestry, agricultural, urban, and industrial)

Interoperability and accessibility of cadastral data consist of producing a relevant digital public service accessible to a majority of people by guaranteeing the reliability, availability and interoperability of the data, by guaranteeing the reciprocity and balance of exchanges between all voluntary actors around the data, and by creating the conditions necessary for the restitution of produced data.

“**Smart City**” refers to the particular creation of new services based on innovative technologies, mainly digital, to facilitate the daily life of inhabitants.

Although this concept originated in the private sector, the local authority also has a role to play, not only in the provision and use of data, but also in terms of services provided in the framework of public infrastructures (buildings, street furniture, home automation, ...), networks (water, electricity, gas, telecoms, ...), transport (public transport, roads, carpooling, cycling, ...), environment (water, energy, waste management, natural areas, ...), tourism, the local economy, etc. The issue is how to provide quality service, in real time, with that much data and to provide equal access for all.

Examples for such technological developments might be:

- setting up of an "open data" web platform;
- creating a first metropolitan public data service to promote the sharing and use of digital data of general interest in order of using it to create innovative urban applications and services, which would be built on cadastral data;
- developing a 3DCity platform to have a virtual territory fed by multiple data sets to simulate and predict what will happen.

**Q3) Examples of specific situations and experiences in your country: What tools are made available by the cadastral authorities to the various users to access and use cadastral data?**

| Q3) | Available tools for the users to access and use cadastral data:   |
|-----|---|
| AT  | <ul style="list-style-type: none"> <li>• web- portal to download all cadastral data on a daily basis and data on a specific date based on standard Charges and Licensing Conditions (bev.gv.at)</li> <li>• web service to integrate cadastral data in the own application of a user</li> <li>• open web platform with including cadastral data for free use (data.bev.gv.at)</li> <li>• cadastral service: access for everyone to daily updated cadastral information in combination with different themes (e.g. Digital Orthophoto, Austrian basemap,..) for free use</li> </ul>   |
| BE  | <p>Development of a public platform “MyMinfin” that centralizes all information on real estate and cadastral data. Collaboration with sister administrations and data exchange between the federal government and the regions. Aim of this system is for the citizen to centralize all the tools related to his private real properties, including geodata, physical and legal information and changes to real estate, land registration, precadastration... This platform respects the only once principle towards our citizens.</p>   |
| CH  | <p>More than half of the 26 cantons adopted an Open Government Data policy for cadastral data. Most cadastral data along with many other geodatasets are made available on cantonal web portals with some similar but still rather basic functionalities (mainly viewing). Large cities also set up their own portals, a few of them include 3D data with buildings.</p>  |
| CZ  | <ul style="list-style-type: none"> <li>• ČÚZK provides open data in accordance with open formal standards. The local open data catalogue, which provides metadata about open data, are harvested daily to the National Open Data Catalogue (NKOD). The data provided for the INSPIRE infrastructure are harmonized according to the requirements of the European Commission and are provided to the same extent as in the entire European Union. <b>Land and building datasets are added beyond the requirements of INSPIRE in the extended data model.</b> The data are provided in two coordinate systems in open XML format through WMS browsing services. Data download is possible via WFS services or via ATOM services for pre-prepared data sets. Link with English description of services is <a href="https://services.cuzk.cz/">https://services.cuzk.cz/</a>.</li> <li>• Before mentioned enrichment of RÚIAN (resp. cadastre) with the special purpose territorial features is also one of such example – the reference (binding) data are kept in special agenda systems from which it is transferred into RÚIAN and openly published.</li> </ul> |
| DE  | <p>download portals, web-services such as WMS, WFS,..., SDI, web shops</p>  |
| DK  | <p>Cadastral data are open and free data, but it is up to the private sector and other authorities which tools they want to use.</p> <p>On our website, it is only possible to get the basic information about a property. For example is it possible to search an address, and get information about location, size, numbers of parcels and selected public law restrictions.</p> <p>The true value is when You combines information from different registers</p> <p>For example, a wild animal rescue service has developed an app that combines GPS coordinates with the cadastral map, and then with owner information from the Land Registry, so you can easily get the owner's permission to move on a property if necessary.</p>   |
| EE  | <ul style="list-style-type: none"> <li>• Open data provided free of charge is the main example.</li> <li>• Geoportal providing all kind of map services would be the next example: Land Information, Address Data, 3D map, Aviation Data, Aerial photos warehouse, Change in Forest Heights, Cross-trees, Engineering Geology, Road register, Nature Information System, Flood Hazard Areas, Geodetic Points, Geological data 1:50,000, Geological data 1:400,000, Heat Areas, Hereditary Culture, Historical Map Collec-</li> </ul>  |



|     |   |
|-----|---|
| Q3) | Available tools for the users to access and use cadastral data:   |
|     | <p>tion, Hogweed Colonies, Land reclamation Systems, Local Tradition, Map of Organic Land, Marina Areas, Mineral Deposits, National Register of Monuments, Nature Conservation Work, Noise Data, Pilgrimage Map, Places Name Register, Port Map, Public Detailed Plans, Public Land Usage, Restrictions Information System, Slopes and Areas Sensitive to Nitrates, Soil Map, Subsidies for semi-natural census, State Forestry Works, Hospitals and ambulance bases.</p>   |
| ES  | <p>The Spanish cadastre was a pioneer public sector organisation in its facilitation of access and re-use of its data for free for both commercial and non-commercial purposes. We provide many services and tools to access to our data and to facilitate the proceedings to the citizens and to the public administrations that collaborate with cadastre: ATOM INSPIRE data download services; Cadastral cartography download services in many formats and text file with unprotected information; SOAP / REST services for data query; WMS / WFS services for access to cadastral cartography, Mass downloads or through OGC and INSPIRE services and many others.</p> <p>Citizens can also the possibility of navigation and visualization of cadastral cartography and via cartography download certificates and graphic and literal information of the real estate.</p> <p>A parcel editor for the realization of validation reports for the updating and request of corrections of the parcel by citizens is also possible.</p> <p>In the last year, we are working to generate new services and data sets that are simpler and more sectorized according to the users' needs.</p>  |
| FI  | <p>Mainly web services and API's, such as REST, WMS, WFS and more recently also OGC API Features. A user can therefore get either a map (an image) or actual cadastral data (GML, GeoJSON, XML). Furthermore, there are several e-services to view data of your own property units, query who owns a property unit, register your ownership of a property, register a leasehold or other special right and order extracts and certificates. For professional users, like banks and real estate brokers, resellers of the cadastral data play a central role in offering services. They are using authorities' APIs and have built web services, where they process data from various sources for end-users' needs. Resellers are important also in digitalizing the property transaction, they offer the services for digital property agreements for professionals using NLS document APIs. Among the traditional users, also the police use the cadastre when investigating financial crimes.</p>   |
| FR  | <p>A) There are two types of platforms for making our land data available:</p> <p>1) Online Cadastral Map, two web-platforms:</p> <p>=&gt; <a href="https://www.cadastre.gouv.fr/scpc/accueil.do">https://www.cadastre.gouv.fr/scpc/accueil.do</a>: Free website for online plans, vector format and image, for consultation at the municipality, at the sheet, at the plot</p> <p>=&gt; <a href="https://cadastre.data.gouv.fr/">https://cadastre.data.gouv.fr/</a>: Free open data site for consultation and download cadastral maps: plots, buildings and dressing elements in in Edigeo, Shapefile, DXF, GeoJSON. Property and owner files are not affected.</p> <p>2) Online Cadastral data:</p> <p>=&gt; <a href="https://www.data.gouv.fr/fr/datasets/5c4ae55a634f4117716d5656/">https://www.data.gouv.fr/fr/datasets/5c4ae55a634f4117716d5656/</a>: This "Requests for Land Values" or DVF database lists all land sales made over the past five years, in mainland France and in the overseas departments and territories - except in Mayotte and Alsace-Moselle</p> <p>=&gt; <a href="https://data.economie.gouv.fr/explore/dataset/fichier-fantoir-des-voies-et-lieux-dits/information/">https://data.economie.gouv.fr/explore/dataset/fichier-fantoir-des-voies-et-lieux-dits/information/</a>: The File "FANTOIR" lists the names of localities and roads for each municipality, including those located in subdivisions and condominiums.</p> <p>=&gt; SPDC and Télé@ctes:</p> <ul style="list-style-type: none"> <li>• SPDC: Professional Cadastral Data Server available only to expert surveyors and notaries. It allows expert surveyors and notaries to retrieve cadastral data before the drafting of deeds or survey documents, but also find in this space legal news and practical sheets that facilitate their procedures.</li> </ul> |

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| Q3) | Available tools for the users to access and use cadastral data:  |
|     | <ul style="list-style-type: none"> <li>• <b>Télé@ctes:</b> A process for modernizing the State in partnership with notaries. Télé@ctes now makes it possible to dematerialize exchanges between notaries and the land registry service (SPF) for mortgage requisitions and deed publications, as well as updating the SPF's property file for simple deeds.</li> </ul> <p>B) But also in parallel with the establishment of platforms, agreements are signed between the DGFIP and various public or private authorities: For example: agreement with IGN for RPCU process, and orthophotography.</p>  |
| GR  | <p>The Hellenic Cadaster operates an open data portal disseminating for the past decade a one-meter resolution orthophoto mosaic that completely covers the country, free of charge. More recently other data sets have been included, for example (a) aggregated statistics on transactions and (b) parcels (INSPIRE format).</p> <p>In the past two years, several digital services based on our data have been made available to citizens and professionals. Most notably, we have released a digital platform that permits accessing our data (both geometrical and legal), at variable degrees of detail, to professionals (law and engineers) completely free of charge. It is estimated that approximately one million property records are accessed per month via this service.</p> <p>The public sector has on-demand access to our full range of data.</p>   |
| HR  | <p>The State Geodetic Administration has enabled the download and use of cadastral data through the service (INSPIRE compliant WFS download service for INSPIRE theme Cadastral parcels) and the use of application for external user through which parties can submit requests and download data in digital form.</p>   |
| IT  | <ul style="list-style-type: none"> <li>• <i>Institutional web portal:</i> it allows all citizens to access the consultation of cadastral data (free-of-charge if concerning their own properties, otherwise on payment)</li> <li>• <i>Sister web portal:</i> mainly addressed to private chartered surveyors and notaries, it allows the access to the cadastral data and the on line submission of the updating documents (on payment)</li> <li>• <i>Web portal for Municipalities:</i> it allows all the municipalities to access free-of-charge to the cadastral data and current cadastral updating documents, for fiscal and urban planning</li> <li>• <i>Cadastral Cartographic Geoportal:</i> it allows all citizens to access free-of-charge the consultation of cadastral cartography, through research tool and the dynamic visualization of the parcels existing in cadastral cartography, kept constantly updated by an automatic process, based on technical updating documents carried out and online submitted by private chartered surveyors (free-of-charge)</li> <li>• <i>WMS Cadastral Cartographic Services:</i> based on the Web Map Service 1.3.0 standard, can be used through <i>GIS (Geographic Information System)</i> software, or specific applications available to the user (free-of-charge)</li> <li>• <i>Application Programming Interface,</i> for searching and extracting of continuously updated cadastral data and their use within the web portals of other administrations, for services supplying to citizens</li> </ul> |
| LT  | <p>Electronic services (system-to-system or web services) have been created and are being developed for businesses, residents, municipalities in which territory land use restrictions apply, possessors and owners of land parcels. Interfaces with other state information systems have also been developed. Anonymised data of the Real Property Cadastre and Register were opened.</p>   |
| LV  | <p>Opening data from the State Cadastre Information System (both text data and spatial data – Cadastre map), the State Address Register (both text data and spatial data) and the Real Estate Market Information System. The amount of cadastre data available to an identified person in the portal kadastrs.lv is available free of charge, as well as the e-service “Creating data selections” is available free of charge.</p>   |
| NL  | <p>The cadastral (index) map is available as open data and accessible through our national geospatial portal (PDOK.nl).</p>  |

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| Q3) | Available tools for the users to access and use cadastral data:  |
|     | <p>Cadastral and Land Registry data are available under an 'open access' regime. The cadastral registration itself is a so-called 'key register'. The use of its authoritative data is mandatory for public sector bodies and all layers of government. For these we offer downloads, notifications, web-services and API's. Our policy is to providing data at the source.</p> <p>Cadastral information for consumers is available through our web site; citizens have access to their own data through the official government portal (MijnOverheid). Professionals use the MijnKadaster environment.</p>  |
| PL  | Cadastral data is made available to users via the WMS and WFS. These services represent data collected directly by the cadastral authorities. WFS retrieves data from specific storage mechanisms and provides a standardized view of data from different sources and queries.   |
| PT  | For use by the common citizen, is available a viewer of the cadastral parcels. For public entities, especially municipalities, Web Map Service (WMS) and Web Feature Service (WFS) are available that allow the inclusion of cadastral information on other platforms and data crossing. In 2023, we will publish this WMS in the Inspire Directive with download restrictions but in the next couple of years is inevitably that cadastral parcels will be open data. The implementation of the cadastral information system is in progress as it is the interoperability platform between our system and the Institute of Registration and Notary Affairs and Tributary and Customs Authority systems. |
| RO  | The open data platform is periodically updated; there are in place functional apps which consume data in real time (like the National Electronic Register of Addresses, The "Immovables" app which is presenting the immovable registered in e-Terra (integrated information system of cadastre and land book), or the National Agricultural Register.   |
| SE  | The national geodata platform, first themes available are detailed plans and extended information on building objects.   |
| SI  | <p>We made all cadastral spatial data accessible via network services that are compliant with one of the international SIO standards (e.g. WFS, WMS issued by OGC or ATOM Feed issued by IETF). All these services are open and free of charge for all users. We also plan to implement Rest API services (OGC standards compliant) in next 5 years.</p> <p>There are also some applications (web viewers, download portals) where users can log-in and view or download spatial data according to their authorizations.</p>   |
| SK  | Free of charge WMS, Portal of the electronic cadastral services, free of charge cadastral data and cadastral maps (some of them available in form of open data)  |

**Q4) How does your cadastral system implement technical processes and workflow between the different kinds of users who access and work with cadastral data?**

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| Q4) | Implementation of technical processes and workflow between the different kinds of users who access and work with cadastral data:  |
| AT  | <ul style="list-style-type: none"> <li>in Austria, it is mandatory for licensed surveyors to enter the data (to change cadastral parcel and the content of the Cadastral map) in electronic legal transactions digitally and in a structured form based on a special workflow as part of the updating process by the Cadastral-Management System;</li> <li>users can use our web service to integrate cadastral data into their applications</li> </ul> |
| BE  | Citizens and companies can access the portal through ID identification and have access to all their data. Partners can obtain data through mass data exchange via web services or request specific data.  |
| CH  | The cadastral system started the digital age with a standardized data-modelling concept, which also included data exchange mechanisms and tools. This concept is based  |

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| Q4) | Implementation of technical processes and workflow between the different kinds of users who access and work with cadastral data:  |
|     | on a data description language called INTERLIS, with which all cadastral, but also all other geodata are being now defined and handled.   |
| CZ  | <ul style="list-style-type: none"> <li>We use many services for data publication/distribution - WMS 1.3.0, WFS 2.0.0, ATOM – for free, all metadata published on ČÚZK Geoportal are based on ISO standards.</li> <li>We use web services of the real estate cadastre such as – remote access to real estate data, special services for land surveyors enabling getting information for creators of survey sketches and for its submission to cadastral office (WSGP).</li> <li>In operation is a special application for notaries, in development a special application for executors (bailiffs) etc.</li> </ul>  |
| DE  | standardised interfaces and web-services  |
| DK  | Cadastral data is available together with a lot of other basic data through a common system called the Data Distributor, which is managed by another agency.  |
| EE  | Estonian Cadastre system uses web map services and web feature services, open API solutions and X-ROAD data exchange layer ( <a href="https://x-road.global/">https://x-road.global/</a> ).   |
| ES  | <p>1) Citizens have open, free-of-charge access to all data except those subject to Data Protection law (personal data of the owner and value data);</p> <p>2) administrations and other public entities, after registering, have access to all levels of data, including protected data, but exclusively for the performance of their own competencies;</p> <p>3) and cadastral owners, identified via digital signature or Concerted key, can also access their own protected data.</p> <p>For this we have defined several technical processes and workflows:</p> <ul style="list-style-type: none"> <li>Interactively for the citizens as a non-expert user, facilitating and simplifying queries.</li> <li>With mass downloads for technical users who use GIS tools</li> <li>And through services for computer developers for implementations of applications for specific purposes. Environment, insurance, real estate, etc.</li> </ul> |
| FI  | The Cadastral system is maintained by the NLS and 71 municipalities. All properties are registered in the same database. Municipalities update the data regularly using file service. The Cadastral system controls the integrity of the data and the process itself. The data is distributed through interface services. The services are authenticated and authorized, and their use is logged. Partners can use our (NLS) API's/services in their own processes.   |
| FR  | <ul style="list-style-type: none"> <li>Workflow between our cadastral system and SPDC professional server to which only notaries and expert surveyors are authorized via the website: <a href="https://www.im-pots.gouv.fr/notaires-geometres-experts">https://www.im-pots.gouv.fr/notaires-geometres-experts</a>, or between our SPF system and Télé@ct in partnership with only notaries.</li> <li>Currently under study a platform for sharing with expert surveyors as part of the work to verify their surveying documents.</li> </ul>   |
| GR  | The main idea is to build services to automate recurring requests and respond to non-standard demands via the conventional path.  |
| HR  | <p><a href="http://www.katastar.hr">www.katastar.hr</a></p> <p>In June 2019, State Geodetic Administration launched a new portal <a href="http://www.katastar.hr">www.katastar.hr</a> in order to digitize its business even more. This portal is designed to serve citizens and all interested parties in the process of dealing with their land and right issues. The portal provides insight into different spatial information depending on your location and it's adapted for display on mobile devices.</p> <p><a href="#">System of digital geodetic report</a></p> <p>Application solution that provides full support to licensed surveyors for the preparation of digital geodetic report following the entire process from downloading digital data of the</p>  |

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| Q4) | Implementation of technical processes and workflow between the different kinds of users who access and work with cadastral data:   |
|     | <p>initial state in GML format, preparation of geodetic report to submit of report for review and confirmation.</p> <p><u>One-Stop-Shop</u></p> <p>One-Stop-Shop (OSS) is a part of the Joint Land Registry and Cadastre Information System (a single register of cadastre and land registry in which systems are interconnected and exchange their real estate data). OSS is a unique service place for access to land registry and cadastre data and consists of two components:</p> <p>Public OSS is available to all users regardless of registration, and allows search and view of basic land registry data and basic cadastral analogue and graphic data;</p> <p>Private OSS is available only to registered users, and allows them to view data, apply for public documents and resolving in the land registry departments and cadastral offices, and to receive official documents.</p> |
| IT  | <p>According to the Italian cadastral rules, owners are obliged to declare to the cadastral administration any technical updating of their own properties (such as subdivisions of land parcels, new buildings or their extensions or demolitions) through chartered private surveyors and any changes of ownership through notaries.</p> <p>Therefore, considering the role of chartered private surveyors and notaries in the cadastral updating system, the Italian cadastral administration pursues the dematerialisation of the updating processes, including the development of online services for data research, view and download and for the submission of updating documents.</p>   |
| LT  | <p>The Real Property Cadastre System has been developed and the customer-friendly technological solutions have been implemented and adapted to different categories of customers offering the possibility to use/receive real-time data. The customers can use cadastral data 7x24 for their needs without any restrictions regarding data flows to and from the Real Property Cadastre subject to contracts or agreements.</p>  |
| LV  | <p>The distribution of cadastre data shall be ensured:</p> <ol style="list-style-type: none"> <li>1) using public sharing infrastructure (ensuring access to web services and e-services that ensure the receipt of data necessary for the performance of the functions of authorities and local governments in accordance with rights)</li> <li>2) using data distribution solutions (web services, replication, access to FTP servers, browsing data on the web-portal – for institutions and municipalities and for individuals)</li> </ol>   |
| NL  | <p>In the field of cadastre land registry we have automated and aligned our processes with parties in the land market (notaries, real estate agents, financial institutions), by agreeing on a set of shared data principles (on sharing data, access rules and date security). In relation to the other key registers (buildings, addresses, business register), we are continually improving the links.</p>  |
| PL  | <p>An example of this is ZSIN (Integrated Real Estate Information System). This is a legal, organisational and technical solution that ensures fast access to current and reliable information on real estate collected in public registers. Access to ZSIN is restricted only to authorized persons.</p>  |
| PT  | <p>The implementation of the cadastral information system is in progress. These functionalities are planned for implementation but it is not yet possible to answer how we implement this functionality cause requirements for development is still in course.</p>   |
| RO  | <p>We are using the same projection system for spatial data, we elaborate Technical Norms that allow data interoperability, and we harmonize the legal framework for data exchange and data sharing.</p>   |
| SE  | <p>Co-ordination and co-operation with municipalities and authorities. Smarter planning and building process is a main area for Lantmäteriet were we are working together with other parties. Also projects with our digital agency, DIGG, on specific areas such as responsibilities as to domains, e.g. geographical and real property.</p>  |

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| Q4) | Implementation of technical processes and workflow between the different kinds of users who access and work with cadastral data:  |
| SI  | <p>At the beginning of April 2022, we implemented a new IT solution that supports the management and maintenance of real estate cadastre data (data on plots and buildings). Authorized surveying engineers also have access to this system, using the IT solution to download data and submit a study of geodetic measurements.</p> <p>The information solution also enables the collection of data on actual land use and data on planned land use from the competent producers of this data (ministries and local communities) and the connection with parcels.</p> <p>Spatial data users can access the data through our distribution system. We also implemented some custom-made services for data sharing with specific institutions (e.g. central population register, land register, banks) that need our spatial data in their production processes.</p> <p>All spatial data users can access cadastral data through open network services.</p> |

**Q5) Are there any current “Smart City” development projects or management situations?**

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| Q5) | "Smart City" strategy and interaction of cadastral data with other urban data:   |
| AT  | Responsible for this topic are the municipalities; in the city of Vienna there are different initiatives to manage smart city projects, for this they also use cadastral information.  |
| BE  | The Smart Cities are managed by the local authorities; every city has the responsibility to provide smart services to their inhabitants using cadastral data provided by the federal public services. There are no national guidelines however on how to implement these services and technologies.  |
| CH  | Cadastral data are made into linked data through unique identifiers. They thus can be used by other applications providing smart city opportunities.   |
| CZ  | <p>Some applications simplifying the arrangement of issues in the cadastre:</p> <ul style="list-style-type: none"> <li>• Entry proposal – helps to clients interactively create the document, which is necessary for registration of land.</li> <li>• Application for creation the document for Announcement of the change of data about the parcel and getting further necessary documents.</li> <li>• Getting the overview of the ownership of a single person (after their authorization) in the application Viewing the cadastre or on the Citizens portal.</li> </ul> <p>Specifications:</p> <ul style="list-style-type: none"> <li>• In fact, cadastral data – maps – are used as a basis in many geoprojects, urban planning etc.</li> <li>• One such a project is preparation of the IS DMVS – information system of the digital map of public administration, enabling to acquire/view/use the data of technical infrastructure in the whole country. Cadastral map will be together with orthophoto-map used as a basis for its creation.</li> </ul> |
| DE  | <p>EU-project mySmartLife in Hamburg, together with Nantes (F) and Helsinki (FI): <a href="https://www.hamburg.de/mysmartlife/">https://www.hamburg.de/mysmartlife/</a></p> <p>Cadastral data is a core component of urban data platforms at urban or regional levels. As part of a so-called geobase twin, many smart city applications are based on data from the real estate cadastre.</p> <p>An example is the Urban Data Platform Hamburg (<a href="http://www.en-ur-bandataplattform.hamburg/">http://www.en-ur-bandataplattform.hamburg/</a>), which provides both geodata and non-geodata via standardized and open interfaces.</p> <p>On this basis, many new and smart applications are possible, so that the citizen service is improved and many processes within the administration are streamlined.</p>  |

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| Q5) | "Smart City" strategy and interaction of cadastral data with other urban data:  |
|     | <p>Urban data platforms, on the other hand, are the technical infrastructure for mapping urban or regional twins, which use cadastral data and other geobasic information as a basis in their various applications.</p> <p>Another Smart City project in this context is Connected Urban Twins (<a href="https://connectedurbantwins.de/">https://connectedurbantwins.de/</a>).</p>   |
| DK  | --  |
| EE  | --  |
| ES  | <p>Cadastral information, is used to develop many new products associated with a large variety of activities. The cadastral data of buildings are already very useful as reference information to create services that add other types of information in addition to the cadastral one itself.</p> <p>Having also our cadastral model information at the local level within a building with a unique and persistent identifier, it is possible to join attribute information of many types on these graphic objects: statistics, equipment, etc.</p> <p>Therefore, we can say that we make available the data and people use it in "Smart city" domain. But also in smart territories (rural areas).</p> <ul style="list-style-type: none"> <li>• Smart Cities en España <a href="https://inarquia.es/smart-city-ciudades-inteligentes-espana/">https://inarquia.es/smart-city-ciudades-inteligentes-espana/</a></li> <li>• Smart Cities españolas <a href="https://es.fi-group.com/smart-cities/">https://es.fi-group.com/smart-cities/</a></li> <li>• Red española de Ciudades Inteligentes <a href="https://reddecidadesinteligentes.es/">https://reddecidadesinteligentes.es/</a></li> <li>• Plan Nacional de Territorios Inteligentes Red.es <a href="https://red.es/es/iniciativas/proyectos/plan-nacional-de-territorios-inteligentes">https://red.es/es/iniciativas/proyectos/plan-nacional-de-territorios-inteligentes</a></li> <li>• <a href="https://avancedigital.mineco.gob.es/es-es/Novedades/Documents/Plan_Nacional_Territorios_Inteligentes.pdf">https://avancedigital.mineco.gob.es/es-es/Novedades/Documents/Plan_Nacional_Territorios_Inteligentes.pdf</a></li> <li>• <a href="https://ekiona.com/territorios-inteligentes-mas-alla-de-las-ciudades-inteligentes/">https://ekiona.com/territorios-inteligentes-mas-alla-de-las-ciudades-inteligentes/</a></li> <li>• <a href="https://smartislandcluster.org/territorios-inteligentes-que-son-y-estrategia-en-espana/">https://smartislandcluster.org/territorios-inteligentes-que-son-y-estrategia-en-espana/</a></li> </ul> |
| FI  | <p>In Finland the Smart City Strategy has mainly been implemented by cities and municipalities. The key stakeholder in Finland is Forum Virium Helsinki. Smart City activities are mainly concerning buildings and Intelligent Transport, but also cadastral information has a fundamental role in Smart Cities.</p> <p>In the NLS there has been some discussion about a national digital twin, that could combine sector-specific and regional twins through location and interoperability and possibly create a twin in those areas where the municipalities are not able or willing to do it.</p>   |
| FR  | <p>This strategy was initiated by our local authorities and metropolises in order to facilitate their local decision making in the management of their territory. They have used our cadastral data as a reference to identify the limits of the private domain (plot of land, building, etc.) and thus delimit the public domain (roads, rivers, etc.).</p> <p>Among the French cities, as Lyon, Strasbourg, Toulouse, some projects are currently under development:</p> <ul style="list-style-type: none"> <li>• 3DCity platform</li> <li>• open data web platform</li> <li>• metropolitan public data service</li> </ul>  |
| GR  | We provide data to municipalities in order to identify their properties and better manage them in all aspects (including smart city applications, safety, investments, etc.).   |
| HR  | --  |
| IT  | <p>For many cities, it is as an opportunity to acquire a new and innovative way to interpret and manage territories and urban communities, in which cadastral data might be involved.</p> <p>In some cases, this process is linked to the harmonization and integration of existing urban policies; in other cases, it focuses on triggering participative processes for sharing</p>  |

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| Q5) | "Smart City" strategy and interaction of cadastral data with other urban data:   |
|     | <p>policies and aims. A strategic approach to the development of the Smart City is generally based on structured and interdisciplinary documents, which aim at supporting the correct allocation of resources and the engagement of local stakeholders.</p> <p>As direct action of the cadastral administration, the development of tools, able to encourage the "online collaboration" with citizens, ensures easy and equal access to all and has represented an effective way to overcome also the limits caused by the pandemic.</p> <p>On the other hand, the cadastral cartography and data on buildings, together with geo-referred utilities, supports the communication network planning.</p>   |
| LT  | <p>The project solutions described in the answer to Q2 are being implemented in order to create a 3D cadastre in the entire territory of the Republic of Lithuania.</p> <p>An open data platform has been developed and maintained. Electronic services of the regional geo-informational environment (REGIA) for making digital data publicly available and sharing it have been developed.</p>   |
| LV  | Individual development projects of local governments, implemented together with private investors.   |
| NL  | We have been involved in smart city developments during the last decade. In practice these initiatives are still happening, but are more and more positioned as digital twins.   |
| PL  | GUGiK is not responsible for "Smart City" strategy.  |
| PT  | The integration with cadastre is not yet possible.   |
| RO  | <p>The Smart City concept is becoming more and more popular. The Romanian Association for Smart Cities includes members from various fields, like Municipalities, Local Communities, Universities, etc. and they look after "Smart Cities" projects, based on an existing Strategy for Smart Cities.</p> <p>Many cities have started to develop projects related to Smart Cities (mainly in the field of public transportation) and there is already a community that can be considered advanced in this field. (Communa Ciugud, in Alba County).</p>  |
| SE  | Lantmäteriet co-operates with others regarding these questions, e.g. within the framework of Smart Built Environment.  |
| SI  | <p>According to the Ministry of Public Administration (MJU), which runs the digitisation process in Slovenia, Slovenian municipalities most often choose to introduce smart solutions in the field of resource management and infrastructure, culture, sport, tourism, environmental care, mobility, logistics and transport. Also in Slovene municipalities there are electronic trees, smart street lighting, smart parking lots and the like – devices that record the habits of citizens. Questions are being raised about the company's development of surveillance and the possibility of alternative data use acquired by smart tools. There are several companies in Slovenia who supports all real estate operations and workflows in one simple solution, which provides portfolio transparency and efficient management. This solutions support local governments in managing their real estate portfolios conveniently and transparently. A unique real estate ecosystem for easy communication and cooperation among different municipality institutions and departments. All cadastral data are free of charge and without any limitation available for all purposes of use and from those reasons are cadastral data included as basis into this solutions.</p> |
| SK  | --   |

### 2.3 The Cadastre and its Contribution towards a More Sovereign, Effective, and Ecological European Model

The valorisation of digital cadastral data could lead to a European model with an added value data which would be recognised by its quality, reliability, accuracy, freshness and



documented nature (documented nature means that data are qualified by specific attributes). The availability of this authentic data would condition the possibility of public decision-making in ecological or other fields, i.e. it would be of real critical importance to the public authorities.

Efficiency gains therefore suggest the cadastral systems for such data would be interoperable with other independent systems, in order to create a network and facilitate the transfer of data.

**Q6) Do you think that your cadastral authorities are contributing to the valorisation of digital cadastral data – Towards a more sovereign, effective and ecological European model?**

**Please rate the contribution on a scale from 1 (no contribution at all) to 5 (very relevant contribution):**

| Q6) | Contribution | Comment / Remark   |
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| AT  | ...4.        | --   |
| BE  | 1...         | Through collaboration between the regions and the federal public service, errors in cadastral data can be identified and rectified. The regions are mainly responsible for environmental matters.  |
| CH  | ...4.        | Cadastral data are accurate, updated, and reliable. They are fit-for-purpose to be used in larger geodata infrastructures, which are the platforms for further services with added value. A crucial element is that most objects in the cadastral system have a unique identifier in order to be used as linked data across the administration.  |
| CZ  | ...4.        | Of course, they are contributing. Within the framework of cadastral revisions, the cadastral documentation is being improved. Similarly in mapping and land surveys. There is a constant check of the content of the cadastre, which reveal inaccuracies in the real estate cadastre documentation.<br><br>In terms of efficiency, the whole process of registration of changes is conducted digitally, with scanning of input documents if they arrive on paper, and an effort is made to achieve the maximum extent of electronic data submission.<br><br>The problem with full digitisation is the requirement for authorisation and authentication of those individuals submitting change requests. Not every client is able or willing to agree to this form. |
| DE  | ...5         | NMCAs in Germany are fully aware of the valorisation of digital cadastral data. One aspect is to add Land Use and Land Cover as a new part of AAA data model, <a href="https://www.adv-online.de/GeoInfoDok/GeoInfoDok-NEU-Referenz-7.1/AAA-Anwendungsschema-7.1.1/">https://www.adv-online.de/GeoInfoDok/GeoInfoDok-NEU-Referenz-7.1/AAA-Anwendungsschema-7.1.1/</a> . Rather more important is to combine digital cadastral data with other relevant data as from Copernicus, LIDAR etc.   |
| DK  | .2...        | A slightly higher data quality is needed (especially the cadastral map) d before the full potential can be realized  |
| EE  | ...5         | --   |
| ES  | ...4.        | We have been providing open and free digital cadastral information from 2004 for multiple uses, including environmental ones. We can give many examples, for example<br><br>The Cadastre has been providing information in a verifiable way during the period of eruption of the volcano of La Palma or the floods of the Ebro River based on the monitoring of these phenomena carried out by the Emergency Management Service of the Copernicus program. The cadastral information   |

| Q6) | Contribution | Comment / Remark  |
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|     |              | has been used for decision-making both during the development of the events and in the subsequent stage for the evaluation of damages, losses, etc.   |
| FI  | ..4.         | <p>Development of Cadastral data:</p> <ul style="list-style-type: none"> <li>• Start of the work to formalise the basic processes for improvement of cadastral data. When finished the use rights and servitudes are shown reliably on a real estate unit also concerning the location and you do not have to search for the information from the history data and documents.</li> <li>• In the project a service interface on these use right units will be built so that the use rights and servitudes can be shown in the map view of the service.</li> <li>• The service will be expanded so as to be able to retrieve the before-mentioned information to the map view, which offers clear benefits to the customer.</li> <li>• According to legislation it is possible for other authorities to update the Cadastre directly from their own databases. However, only the National Enforcement Authority does this at the moment in the Land Register from which it is available also in cadastral activities. Plans to enable the other relevant authorities to do the same are underway and aiming at mapping the situation 2023.</li> </ul> <p>New services are constantly being developed to enable up-to-date and efficient digital transactions.</p> |
| FR  | .2..         | <p>At the national level, processes have been put in place for:</p> <ul style="list-style-type: none"> <li>• updating, control, reliability, improvement of continuity and georeferencing (RPCU process) of the graphic cadastral data (cadastral map and its various geographic layers and littoral data) to obtain better quality data in terms of completeness, identification, geometric accuracy and positioning,</li> <li>• but also the dissemination of the cadastral map on open data platforms (<a href="https://cadastre.data.gouv.fr/">https://cadastre.data.gouv.fr/</a>) in Edigeo, Shapefile, DXF, GeoJSON to be interoperable with other independent systems, in order to create a network and facilitate the transfer of data.</li> </ul> <p>Question: the next step is to know how to respect the RGPD regulation and share this data at the European level, knowing that we also produce data in WMS and WFS according to the Inspire directive?</p>   |
| GR  | ..3..        | Our contribution is becoming more and more critical to public authorities. The cadastre is the foundation of any investment. Planning is facilitated by rapid and reliable identification of suitable and available land for development etc. Cadastre information is used to improve location decisions and benefit the environment.   |
| HR  | ..3..        | By sharing cadastral data, other state bodies use them in their business processes in such a way that cadastral data are the basis for their spatial databases or that cadastral data are additional attributes in relation to their source databases.  |
| IT  | ..4.         | The contribution mainly concerns the easy access to the cadastral data and its interoperability with other independent systems (for example, by WMS services).  |
| LT  | ...5         | Real property cadastre data is provided to other state information systems where value-added electronic services are created using this data.   |
| LV  | ..4.         | --  |
| NL  | ..4.         | In the Netherlands we face a large number of strategic issues in the spatial domain (energy transition, climate change, biodiversity, mobility, housing). This  |

| Q6) | Contribution | Comment / Remark   |
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|     |              | requires a multidisciplinary approach in conciliating all these demands. Cadastral information is a useful building block in making this happen in a trusted and accepted manner.  |
| PL  | ...4.        | <p>Yes, thanks to the integrated services provided by GUGiK, the cadastral data is up-to-date. There are 380 poviats in Poland where the land and building register is stored (cadastral database). It is not a central system. In total, the Polish cadastral database consists of 37 million parcels and about 15 million buildings. In the second half of 2018 GUGiK undertook actions aimed at publishing the cadastral data directly from the poviat (county) servers. The aim of this undertaking, was to create web services providing broad access to all poviat data bases - with the help of administration units and commercial companies. As a result of the activities, among others KIEG (The National Integration of Lands and Buildings) service was created. Data in KIEG come directly from all 380 poviat databases. They are available in the WMS view service <a href="http://integracja.gugik.gov.pl/cgi-bin/KrajowaIntegracjaEwidencjiGruntow?lang=en">http://integracja.gugik.gov.pl/cgi-bin/KrajowaIntegracjaEwidencjiGruntow?lang=en</a></p> <p>In 2021 was record use of KIEG service - 850 million calls, an increase of over 58% compared of 2020.</p> <p>In addition, thanks to current cadastral data, it is possible to elimination of bureaucracy in geodetic works (e.g. license document, supplementary declaration, etc.) and improving of the data update process in the land and buildings registers, i.e. in the mode of material and technical activities.</p> |
| PT  | .2...        | <p>On those 50% of Portugal territory where exists cadastre, interoperability between systems is not yet implemented. Cadastral information is still shared using web services, giving access on demand to public entities, especially local entities as municipalities. For the other 50% of Portugal territory there are no cadastral parcels.</p> <p>A National priority is to have full territory covered with cadastral data, as well interoperability between systems that host cadastral data, tax information, and registry data.</p>  |
| RO  | ...5         | We contribute to pan-European Projects that are adding value to national cadastral data, and support fast reactions in emergency situations.   |
| SE  | ..4.         | More of open data requires other types of financing models than today, also focus on security aspects are important to consider as to these questions.   |
| SI  | ..4.         | Surveying and Mapping Authority is part of Ministry for environment and spatial planning. From those reason we (our data and services) are integrated into all processes within Ministry and Slovenian environmental agency and that mean that we are contributing also within valorisation of digital cadastral data in our country. Availability, accessibility, and interoperability of the land data are necessities for effective land administration and from those reason cadastral data and services play an important role in green deal and common data space in Slovenia and wider in Europe.   |
| SK  | ..3..        | --   |

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