eurogeographics

ANNUAL REVIEW 2019

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OUR MEMBERS

Our members are the National Mapping, Cadastral and Land Registration Authorities in Europe.

We currently represent more than sixty official government bodies responsible for geodetic surveying, topographic mapping, cadastral surveys and land registration in 46 countries – from Iceland to Cyprus, Portugal to Azerbaijan.

EuroGeographics' members fulfil an essential role providing official, definitive and detailed geospatial information for the public good. These are underpinned by professional, scientific and technical expertise and support a wide range of applications, including positioning, navigation and emergency response.

By simplifying access to their data, our members are driving applications to realise a wide range of social, economic and environmental benefits, as well as quicker, more efficient, secure and reliable land registration in support of an equitable property market.

A full list of our members can be found on pages and

PRESIDENT'S REPORT

Data from official national sources is important because it supports a range of legal, fiscal, security and other public administrative purposes, and provides reliable, consistent context and clarity to information about people and places.

In many countries, the cadastral, geodetic surveying, topographic mapping and land registration process carried out by our members is enshrined in law with a public body given authority for the task. This makes the data authoritative according to our research with EuroSDR and KU Leuven.

Our joint paper defines authoritative data as data provided by a public body (or authority) which has an official mandate to provide it, that is based on a set of criteria to ensure known quality, and that is required to be used and reused by the public sector and society as a whole.

The importance of authoritative data has long been recognised at a national level and is increasingly recognised internationally, in particular in addressing the United Nation's (UN) Sustainable Development Goals. Together with our members, we are committed to facilitating access to it and to unlocking its value across the European and international systems and integrating it into a sustainable infrastructure for the public good.

Other sources can supplement, but not replace, reliable, comparable official data of verifiable quality. Communicating the value of our information is therefore crucial.

We must demonstrate its critical role in helping to address key issues that extend across borders and require fully connected national databases.

EuroGeographics and its members have a long, successful tradition of working with the national statistical agencies. Integrating our data brings context and clarity to information about people and places. This provides valuable insight, helping decision-makers to ensure maximum impact in areas where action is most needed. This is particularly true for the United Nation's 2030 Development Agenda which presents an unrivalled opportunity for us to promote the tangible benefits that together we deliver to society.

In Europe, the new Open Data Public Sector Information Directive, which identifies geospatial data as one of five 'high-value' data themes that warrant further regulatory action, creates many opportunities. We continue to work in partnership with members to explore how appropriate pan-European datasets can be made more widely available to meet international requirements under terms that are free for use and reuse consistent with the Directive.

Working together, we can seize this moment to demonstrate the benefit of authoritative, trusted information and raise awareness among politicians and policymakers of our value in delivering better data for better lives.

The case studies contained in this review of our joint activities in 2019 demonstrate the great personal, societal and economic importance of our members' data. They continue to fulfil the essential role of providing official and detailed geospatial, or location, information for important public purposes.

I would like to take this opportunity to thank our Secretary General and Executive Director, Mick Cory, and the Head Office team for all their hard work and support.

Finally, I would like to thank my fellow Board members, both current and those who completed their term in October 2019, for their significant contribution to EuroGeographics on behalf of its members.

Colin Bray
President, EuroGeographics

ABOUT US

Connecting you to maps, geospatial and land information for Europe

EuroGeographics is proud to be the voice of the European National Mapping, Cadastral and Land Registration Authorities.

We bring together national authorities from the whole of geographical Europe in a unique international membership association. By providing a single point of contact, we enable government, business and citizens to benefit from their official, reliable, comparable and verifiable geospatial data and collective expertise.

EuroGeographics believes in a society empowered by the use of trusted geospatial services from official national sources. To do this we facilitate access to our members' geospatial data and to pan-European geospatial datasets. As an independent, international not-for-profit organisation which supports the public good, we also represent our members' interests and provide forums for sharing knowledge and expertise that help support and improve our members' capabilities and role.

Secretary General & Executive Director's Report

During 2019 EuroGeographics and its members responded to the changing operating environment by agreeing to put data accessibility at the heart of the Association's strategy. At their General Assembly in Manchester, members also pledged to continue working in partnership to achieve the widespread use of their data across the European and international systems. Facilitating access to authoritative data from Europe's National Mapping, Cadastral and Land Registry Authorities, is therefore at the centre of the activities we carry out on our members' behalf. It drives our representation activity and is supported by two-way communication through knowledge exchange and other membership activities.

Facilitating access to members' data

Helping users to find geospatial information from official national sources is in the public interest and supports the public good. It is a key pillar of our activity. The membership map on our website provides links to the national data available from our members, and the case studies in this report demonstrate the value and breadth of our members' activities.

We also integrate and make accessible interoperable pan-European geospatial datasets. These datasets are produced through a unique collaboration between our members, and the data integration process we have developed is a particularly important example of international collaboration in the geospatial area. By working together to deliver pan-European data, our members are demonstrating not only what can be achieved through Europe-wide cooperation but also the benefits that result for the wider public good.

Our datasets include open data, administrative boundaries, topographic mapping, a digital elevation model and a Regional Gazetteer. All are created using official national geospatial data from our members and are harmonised to standard specifications, so users can be confident that the information provided is consistent, comparable and easily shared.

The EuroGlobalMap dataset is now also an open web feature service produced with support from The National Institute of Geographic and Forest Information (IGN France). The addition of NUTS 3 official boundary information in 2019 has enabled our small-scale data users to experience the benefits of integrating geospatial and statistical information to identify trends and patterns.

We also enhanced our dataset of official administrative boundaries of Europe (EuroBoundaryMap) and our multi-themed topographic mapping (EuroRegionalMap), which now includes data from Ukraine. Both are produced by Germany's Federal Agency for Cartography and Geodesy (BKG) on behalf of our members.

Our Core Reference Dataset (CRD) prototype, which was developed with the help of BKG, was provided under an evaluation licence to the European Environment Agency early in 2019. Feedback has been positive, and we must now secure sustainable funding to proceed with full coverage.

The Open ELS Project concluded on 30 April 2019 after two years of work by the project partners. The test services launched at Geospatial World Forum in Amsterdam have played an important role in demonstrating authoritative open geospatial data, and we continue to explore how we might expand these in future.

Representing members' interests

EuroGeographics represents its members' interests internationally in the European institutions, at the UN and through participation in regional collaborative groups such as those in the Western Balkans.

At the UN we are an observer organisation at the UN Global Geospatial Information Management Initiative (UN-GGIM) Committee of Experts and the UN-GGIM Europe Executive Committee. In August 2019, we were pleased to participate in the ninth GGIM plenary at the UN in New York where we made a number of interventions highlighting our members' contributions and our support for the Integrated Geospatial Information Framework, the application of geospatial information related to land administration and management, and the importance of geospatial information and services for disasters.

In Europe we have contributed to the legal debate for the development of the Regulation on establishing the EU Space programme and have participated in the public consultation by the European GNSS Agency on the Integrity and Reliability of Digital Maps for Connected and Automated Driving. We also contributed to the review of the Public Sector Information (PSI) Directive, and together with our members, we are exploring how appropriate high value datasets can be made more widely available to meet international requirements under terms that are free for use and reuse consistent with the new Open Data PSI Directive.

By providing a strong independent voice, we continue to support our members in making the case for their authoritative data to their national governments, as well as through our networks and partnerships. In 2019 we took this message to DGI Europe 2019, the leading global geospatial intelligence conference held in London as well as to the European Forum for Geospatial Statistics (EFGS) in Manchester, the Geospatial World Forum in Amsterdam, and the International Cartographic Conference (ICC) in Tokyo.

Knowledge Exchange

Change is constant, and our members operate in an industry that has seen radical changes over the past 20 years, with no sign that such changes will slow down. We are committed to delivering knowledge exchange activities that provide our members with significant tools to help improve their capabilities and role, impart their experience and learn from others. As a forum for discussing issues of mutual interest, these knowledge exchanges demonstrate the tremendous value our members place in collaborating to find solutions to common challenges, as well as their willingness to share experiences and best practice. During the year, we delivered a comprehensive calendar of events, including support for cadastral and land registry activities in collaboration with the Permanent Committee on Cadastre (PCC), and a series of dedicated webinars on issues such as high value datasets, INSPIRE and data quality. Our work with EUROSDR and KU Leuven on authoritative data demonstrates how we work with strategic partners for the wider public good and benefit of our members.

Our strength as an Association of member organisations from across Europe lies in our ability to work together to achieve our shared ambition of a society empowered by the use of trusted geospatial data and services. I look forward to this cooperation and collaboration continuing into the next decade and beyond as we seize this opportunity to continue to contribute to the economy and society as a whole, for the wider public good.

Mick Cory
Secretary General and Executive Director
EuroGeographics

A FEW HIGHLIGHTS FROM 2019

Facilitating access to your data

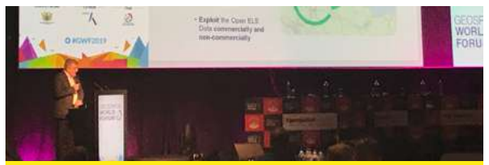
Our Data Producers - A unique example of international collaboration

A unique example of international collaboration

Our data integration process is unique internationally, and a particularly important example of international collaboration in the geospatial area. Our production teams are multi-national distributed teams responsible for developing our innovative datasets and services. Their work is led from the Association's offices in Brussels and coordinated by production managers from Germany and France. Our 2019 annual data producers meeting was hosted by the Surveying and Mapping Authority of the Republic of Slovenia in Ljubljana.

Delivering pan-European datasets

To facilitate access to your data and demonstrate its importance, EuroGeographics has continued to maintain and develop its pan-European datasets. EuroBoundaryMap, EuroRegionalMap and EuroGlobalMap were all updated during 2019. Our portfolio also includes EuroDEM and the Regional Gazetteer which was created as part of the Open ELS project. The Core Reference Dataset (CRD) prototype, developed with the help of BKG, was provided under an evaluation licence to the European Environment Agency in early 2019. Feedback has been positive, however funding to proceed with full coverage is still to be identified.



Launch of Open ELS test services at GWF

Open ELS Project

The Open ELS Project concluded on 30 April 2019 after two years of work by the project partners. The Open ELS test services, launched at Geospatial World Forum in Amsterdam, have played an important role in demonstrating authoritative open geospatial data. More information on the outcomes is available here.

Knowledge Exchange

We held a 'Super' KEN workshop following the Extraordinary General Assembly

EuroGeographics was very pleased to participate in the PCC Plenary in Romania

An active programme of events

You have consistently told us that knowledge exchange is a key benefit of EuroGeographics' membership and we continued to deliver an active programme of meetings, workshops and seminars. This includes joint activities, such as with the PCC. The activities and plans of the Knowledge Exchange Network (KEN) are widely communicated and circulated to members by providing a report prior to each of our general assemblies in May and October. All information is available to members via the website.

Members gathered in Manchester, UK for the 2019 General Assembly

General Assembly 2019

We welcomed 48 member organisations from 39 countries to the 2019 General Assembly in Manchester, UK. In addition to opportunities for high-level peer-to-peer knowledge exchange, your discussions also helped to shape the future of the Association so that it continues to deliver value to all members. Members agreed that our focus will now move away from sales with a greater emphasis on facilitating access to your data. This will drive our representation activity and be supported by two-way communication through our knowledge exchange and other membership activities.

It was a pleasure to welcome so many members to our 2019 Extraordinary General Assembly

Extraordinary General Assembly 2019

Seventy representatives from 33 member organisations participated in our extended 2019 Extraordinary General Assembly in Leuven, Belgium. To bring together KEN chairs and members, we again held a dedicated roundtable session. The meeting was followed by a 'Super' KEN workshop to discuss mutual topics of interest.

Representing your interests

Active monitoring of European Policies

The European Union is a significant influencer and stakeholder whose policies affect all our members' interests. To keep you up to date with significant policy developments, we continued to provide you with weekly policy news summaries, policy news items in the members' newsletter, tracking records and other relevant documents. Our policy knowledge exchange also included briefing papers on the Open Data and PSI Directive, meetings and webinars. All information is available to members via the **website**.

EuroGeographics Secretary General and Executive Director, Mick Cory makes an intervention at GGIM9

An active role in the United Nations

European NMCAs have an important role to play in UN-GGIM and, as your membership association, EuroGeographics is committed to ensuring your distinctive voice and interests are heard. In June, we participated in the 6th Plenary of UN-GGIM: Europe and in August we were pleased to participate in GGIM9 at UN Headquarters in New York. Mick Cory made a number of interventions highlighting your contributions and our support for the Integrated Geospatial Information Framework, the application of geospatial information related to land administration and management, and the importance of geospatial information and services for disasters.

Meetings with key European Commission stakeholders

We have held formal and informal meetings with a variety of European stakeholders including DG Connect, the European Environment Agency, DG Grow, European Global Navigation Satellite Systems Agency (GSA), Eurostat and the Joint Research Centre (JRC).

EuroGeographics is committed to ensuring your distinctive voice is heard within the United Nations

Your Association actively participates in UN-GGIM and UN-GGIM: Europe

Constructive participation in policy development

During the past year, we contributed to the legal debate for the development of the Regulation on establishing the EU Space programme by submitting an information paper to the respective Parliamentary Committee. In addition, we participated in the public consultation by the European GNSS Agency on the Integrity and Reliability of Digital Maps for Connected and Automated Driving.

Representing your interests

Our CLRKEN took an active role in the joint PCC workshop and plenary In Helsinki, Finland

EuroGeographics Management Board took part in panel discussions at GWF

Regional and internatonal collaboration

We participated in a number of regional and international collaborative groups, including the European Forum for Geospatial Statistics (EFGS) in Helsinki and Manchester, the Twelfth Western Balkans regional conference in Bosnia and Herzegovina, and the 29th International Cartographic Conference in Tokyo. Members also took part in panels organised by EuroGeographics at GWF 2019 and DGI Europe 2019, the leading global geospatial intelligence conference held in London. We have maintained our relationships with the Group for Earth Observation (GEO) and EuroSDR.

Our President, Colin Bray spoke at the Twelfth Western Balkans regional conference in Bosnia and Herzegovina

The voice of European NMCAs

Our communications activities have continued to embrace opportunities to promote the importance of authoritative geospatial information to key stakeholders through events, social media and face-to-face meetings. We are also focussed on keeping you up to date with the Association's response to issues impacting on your work through our members' newsletter and letters from our President.

EuroGeographics members highlighted the role of NMCA data at DGI 2019

Mick Cory was delighted to meet with Radu Codrut Stefanescu, Head of the National Agency for Cadastre and Land Registration, Romania which was hosting the PCC Plenary

MEMBERS' CASE STUDIES

Albania

Albania improves geodata with new GNSS network

Albania is improving geodata by launching a new Global Navigation Satellite System (GNSS) which provides the basis of its unique three-dimensional point coordinates.

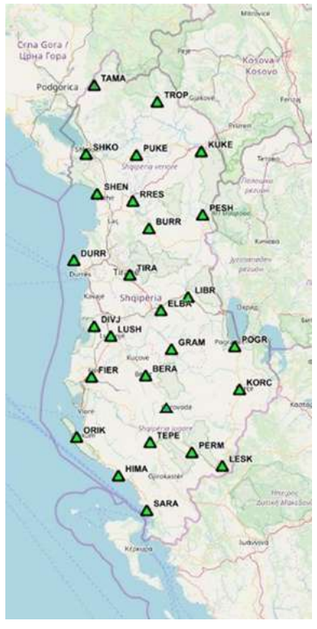
With technical specifications developed by the State Authority for Geospatial Information (ASIG), the cutting-edge infrastructure of the ALBCORS network ensures the accuracy, integrity, continuity and availability of reliable positioning.

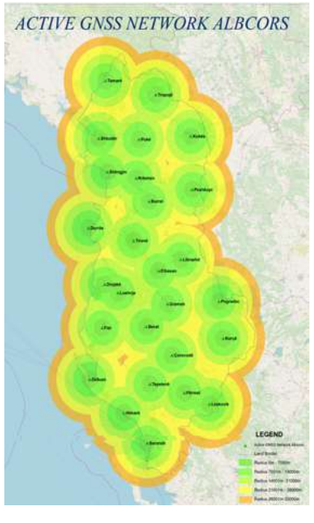
By enabling the implementation and maintenance of European Geodetic Reference according to the INSPIRE Directive, it provides the basis for improving the basic reference used by all public and private institutions to support geodetic works, topographic and cadastral maps, and scientific research in earth dynamics. It also offers an online service and enables GNSS data exchange collaboration with neighbouring countries.

The ALBCORS system consists of 27 active stations, six of which are integrated from the previous ALBPOS system. To guarantee network sustainability and quality coverage throughout Albania, each station is positioned no more than 35 km apart. This facilitates the efficient and effective acquisition and distribution of GNSS data to meet the needs of users.

As a result, ALBCORS improves the coordinate assignment methodology using contemporary technologies and programs for coordinate measurements and calculations using differential and post-processed (or static measurements). High millimeter precision levels in plan and height are achieved through Real Time Kinematic (RTK) methods. For the management of the entire system and its operation, the software installed in the control center is GEO ++.

The network was built with Albanian Government funding according to European standards (Eupos).





Armenia

Putting citizens at the heart of a more transparent, secure and unified Cadastre

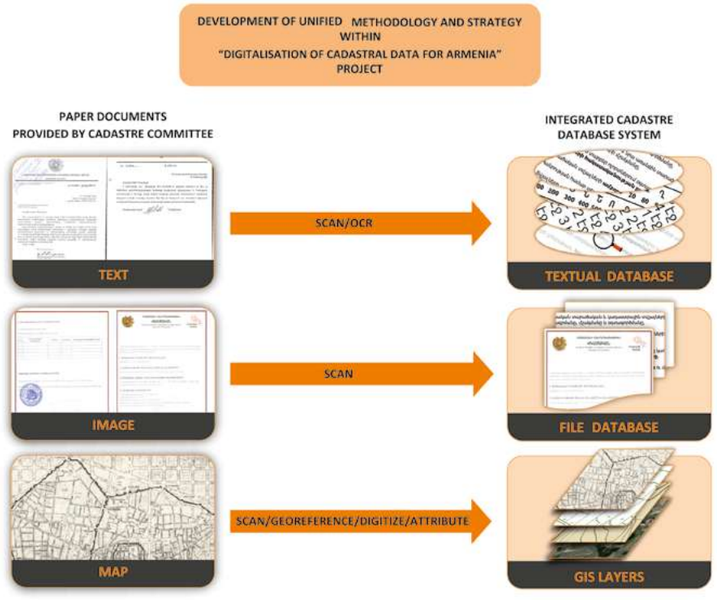
Digitalisation of the cadastral archives in Armenia is facilitating the creation of modern online, streamlined self-services.

The work, part of the Cadastre Committee's five year reform plan, is a key component of the move towards a more transparent, secure, unified and citizen-oriented cadastral system.

The Committee, which maintains around 2.4 million records which are kept in four territorial subdivisions in two buildings in Yerevan, is working in collaboration with The Netherlands Cadastre, Land Registry and Mapping Agency to develop a unified approach and tailored strategy for digitising its archives. Archives are classified according to either addresses or real estate cadastral codes, or both. In some cases classification can also be at the discretion of the relevant archive specialist.

Digitalisation will provide a range of benefits from paperless self-services to improved efficiency.

Once completed, the readability of the scanned documents in the archives will be enhanced and the resulting online, paperless self-service Cadastre will not require direct contact from citizens and officials as far as possible.



Users of the simplified Armenian Real Property Information System (ARPIS) will benefit by reduced working time, increased effectiveness and resource savings. Furthermore, the work also reduces any risk of corruption by significantly simplifying the information acquisition procedure and submission of applications. Documents can be obtained without visiting Cadastre offices and information will be available immediately after inquiry.

By reducing the workload of employees in the territorial subdivisions and front offices, system maintenance costs are significantly reduced. In turn, this contributes to the effective and efficient functioning of the Integrated Cadastre, including collected and processed data accessibility for state bodies, as forecast by the Cadastre Committee in its development programme.

The overall concept of digitised archives includes professional consultancy, particularly for development of unified approaches to archive organisation and classification, and proper software for digitalisation processes, as well as organisation and training on the digitisation of documents, archive transfer, and classification.

Austria

Supporting elections with geodata in Austria

The Federal Office of Metrology and Surveying (BEV) has developed a Central-Constituency-Tool based on the Austrian Address Register, the Austrian Central Residents Register and the Austrian Electoral Register.

The Austrian Address Register authentically displays all the addresses and buildings as allocated by the 2,095 Austrian municipalities. BEV is responsible for the administration of the data of the Austrian Address Register. Federal laws apply to nationwide elections such as to National Council, President and to the European Parliament, while the federal provinces act under their relevant voting legislation for elections to the provincial parliaments, municipal councils and for mayors. Depending on the type of election, different groups of residents are entitled to vote.

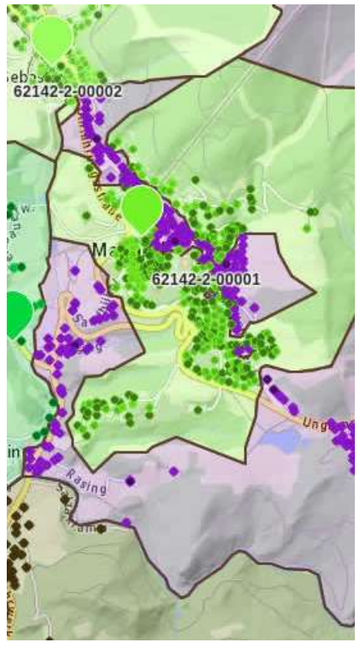
The Electoral Register Law 2018 provides the legal basis for the Austrian municipalities to integrate their data in a centrally managed application.

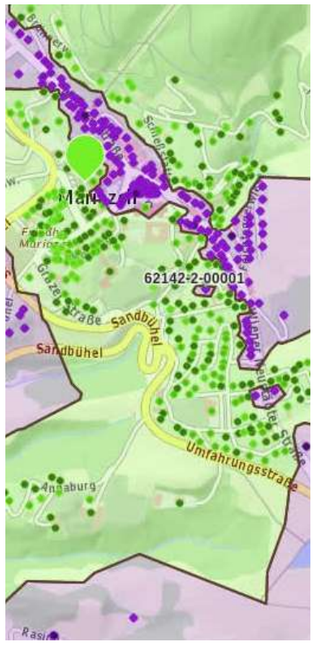
Created jointly by the Federal Ministry of the Interior, the Austrian Association of Municipalities, the Austrian Association of Cities and Towns and the Federal Office of Metrology and Surveying (BEV), the Central-Constituency-Tool links together the data of the Central Electoral Register, the Austrian Address Register and the Central Residents Register and thus standardises and simplifies the core process of elections.

The Central Residence Register already connects the attributions of permanent residents in Austria with the building data in the Austrian Address Register, a central database of all addresses and buildings administered by BEV and used as a reference for mailing, spelling, serial numbers and spatial location.

The connection of all three registers via the Central-Constituency-Tool enables the referencing of buildings where people who are entitled to vote are registered to constituencies and polling stations in the appropriate municipality. The central application gives an overview of the progress of this process – every record is comprehensive.

Quality assurance procedures improve the reliability of correct allocation. For example, a multi-level process ensures that the municipalities evaluate, complete and release the data before any election. The data is then checked and released, first by the districts and then by the provinces who then forward them to the Federal Ministry of the Interior.





Belgium

Delivering data for safer air traffic in Belgium

Belgium's National Geographic Institute (NGI) has built on a history of providing air traffic obstacle data by updating its datasets to meet new International Civil Aviation Organisation (ICAO) specifications.

Evolving ICAO rules for safe air traffic require digital terrain models and air traffic obstacle data. The NGI was asked to adapt the datasets to meet the electronic Terrain and Obstacle Data (eTOD) specifications by the Ministry of Defence and the Federal Public Service Mobility and Transport in charge of aerial navigation. This task started in 2014 with a study of the new legal and technical framework, and the eTOD project itself started at the end of 2016.

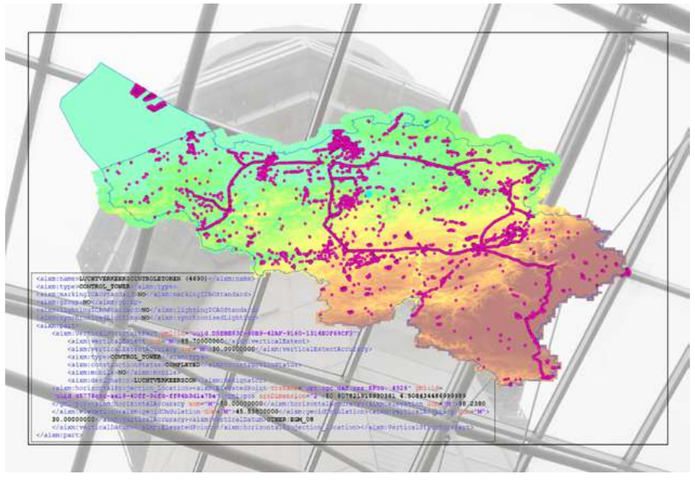
The NGI is responsible for the implementation of the electronic Terrain and Obstacle Database, with the Ministry of Defence, the Directorate-General for Aviation and skeyes (previously known as Belgocontrol) as stakeholders.

The main adaptations in the NGI datasets have been twofold. For the digital terrain model, the change in coordinate system from Lambert 2008 + Ostend height to WGS 84 + EGM 2008 was necessary. For the air traffic obstacles, the addition of semantic information and a new classification as well as an improved accuracy had to be organised.

The database now counts around 6,000 obstacles spread across the whole country, which have a height of 60 metres or more above ground level. The newly structured dataset went into production in September 2019.

The process of adaptation and compliance to new standard specifications gave the NGI the opportunity to simultaneously rethink the process and workflow for capturing and maintaining this air traffic obstacle dataset. As a result, the NGI now collects and maintains the air obstacle data completely in accordance with the ICAO specifications. The expected update cycle is 3 years.

The team is now working on a platform where information of new air obstacles being planned or built can be directly uploaded, an approach that the Ministry of Transport strongly recommends and even wants to oblige in the near future.



Bosnia & Herzegovina

Projects deliver public services for economic growth and social development

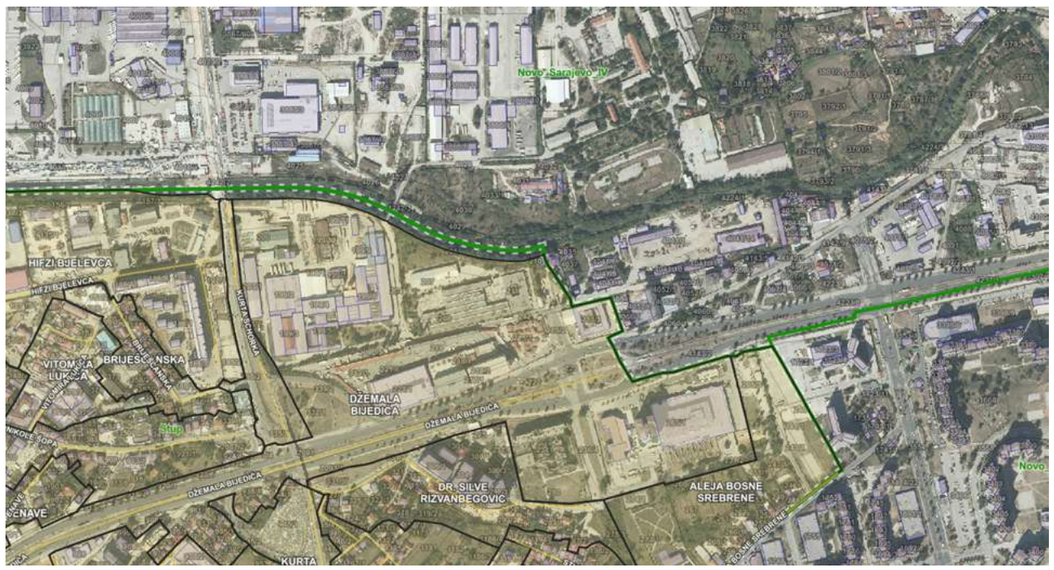
Cooperation and interoperability is delivering a range of projects to provide public services in Bosnia and Herzegovina.

Working with other spatial data holders, the Federal Administration for Geodetic and Real Property Affairs (FGA) is using standards, procedures, and policies to establish accurate, up-to-date spatial data registers. These activities are making a significant contribution towards digital transformation, European Union accession, and overall economic growth and social development.

By the end of 2019, 1.9 million land registry folios had been incorporated in the electronic land registry thanks to the systematic harmonisation of real estate data between the land registry and the cadastre. As a result of the project, funded by the World Bank, 52.9% of these folios are now based on the new cadastral survey as opposed to 30% at the start.

Following the development of an IT system used by local tax authorities and municipal staff, the Sales Price Register (SPR) data was published for public and other users. As a result, almost 30,000 individual transactions have been displayed publicly on the FGA geoportal. Establishment of an up-to-date official database of address data is also well under way. FGA now distributes data for 23 of the Federation's 79 municipalities with full coverage expected by the end of 2021.

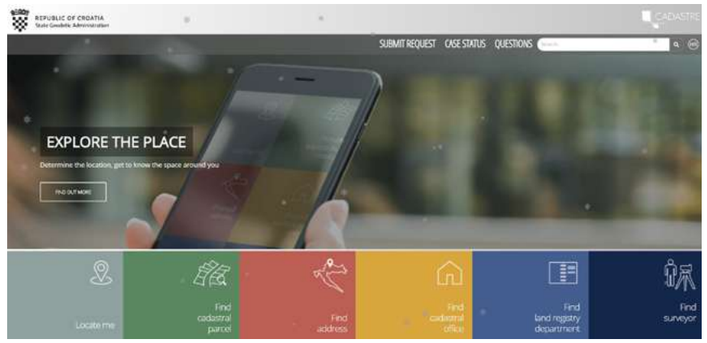
Increased exchange of data via web services with different authorities and local governments is preventing data duplication, the issue of incorrect data from unauthorised sources and helps to clearly define the roles and jurisdictions of public institutions. This not only helps to improve the efficiency of land administration but also lays the foundations for e-government to benefit users.



Croatia

New portals put users on the map with localised information

New portals from the State Geodetic Administration (SGA), Croatia are providing users with geospatial information in general and particularly cadastral ones related to their location with a simple touch of a button.



In June 2019, SGA launched **katastar.hr** to provide information about land rights to citizens and all interested parties. The portal can be accessed on mobile phones as well as computers, and an English language version is available for users who are not Croatian citizens.

The portal uses digital orthophotos, the 1: 5000 scale Croatian base map, and 1: 25 000; 1: 50 000; 1: 100 000; and 1: 200 000 scale topographic maps. By pressing the 'Locate' button on a mobile phone, users can get information about the cadastral parcels around them as well as the nearest cadastral offices, land registry offices and authorised surveyors for the selected location.

When accessed via computer, cadastral parcels can be found either by entering its number, by searching using its address or the name of nearest geographical feature, such as settlement or stream, or by turning on a digital orthophoto. Once selected, information about the owners and holders is displayed with the possessors shown in possessory sheets, maintained in the competent cadastral offices, and the owners in title deed.

Official, up-to-date spatial data from public authorities is also being promoted and made available to citizens through **geohrvatska.hr**. Launched by SGA in cooperation with the National Spatial Data Infrastructure (NSDI) subjects, it aims to increase the level of transparency of public authorities by sharing and using the data.

GeoHrvatska integrates and visualises the spatial data in six thematic areas: Environmental Quality, Land, Nature around me, Leisure, Protected Areas and Nearby Pollution. The information displayed is interoperable and uses network services operated by the institution responsible for the data.

The portal enables the user to use spatial data in a simple, mobile and intuitive way with an emphasis on viewing data for their location using the 'Data Around Me tool', which shows the closest spatial data of the selected thematic area. The system is fully customisable for mobile devices and has a responsive design focussed on mapping the user environment.

Cyprus

Delivering new levels of high accuracy aerial photography in Cyprus

Cutting-edge technology is being used in a project to provide new high precision and high resolution aerial photography of Cyprus.

Participants (Left to Right): Andreas Hadjiraftis (DLS), Andreas Sokratous (DLS Director), Ioannis Marakakis (Eratosthenes AE), Laurent Geradin (representative of Sintegra SAS), Alexandros Velissarios (Director of Eratosthenes AE), Georgia Papathoma (Project Coordinator-DLS) , Ioannis Chatzioikonomou and Andreas Demosthenous (DLS).

An agreement, signed in September 2019, has seen the Director of the Department of Lands and Surveys (DLS) work with a consortium of companies, Eratosthenes SA Greece, and Sintegra SAS France, to deliver the initiative, which is expected to last 12 months.

The project involves the acquisition and processing of high-precision and high resolution aerial photographs and related data, using state-of-the-art equipment and software. The digital data that will be produced will be entered into the Department's Land Information System, and then onto the DLS-Portal and INSPIRE online platform, for direct use by DLS staff to satisfy internal processes, by other government departments, by private organisations and services, and by the public.

The data acquisition phase has already been completed successfully. Data analysis, processing, checking and acceptance phases will follow in the coming months.

The data that will be delivered will include the following: High resolution, 100% cloud-free aerial photos and ortho-photos at an accuracy of ±20-25 cm and 10 cm pixel size; Lidar data; DSM and DTM at 10 points/sqm in urban areas and 5 points/sqm in rural areas; and contour lines at 1m intervals.

The new aerial photographs and related data will be combined seamlessly following predefined standards. They will enable the Department to handle difficult cases from the office, collect reliable cartographic data, and significantly reduce fieldwork time.

The development of the Land Information System and the National Spatial Data Infrastructure (SDI) is the foundation for the development of sound GIS systems for other agencies and users with the aim of creating consistent spatial data, products, and trustworthy applications. The Government fully supports these activities and believes that sound spatial information is needed for good and secure governance at all levels, and that it should always be readily available.

Czech Republic

Delivering the most accurate data available for the Czech Republic

Positional accuracy refinements are ensuring even greater accuracy of the Czech Republic's most detailed topographic database.

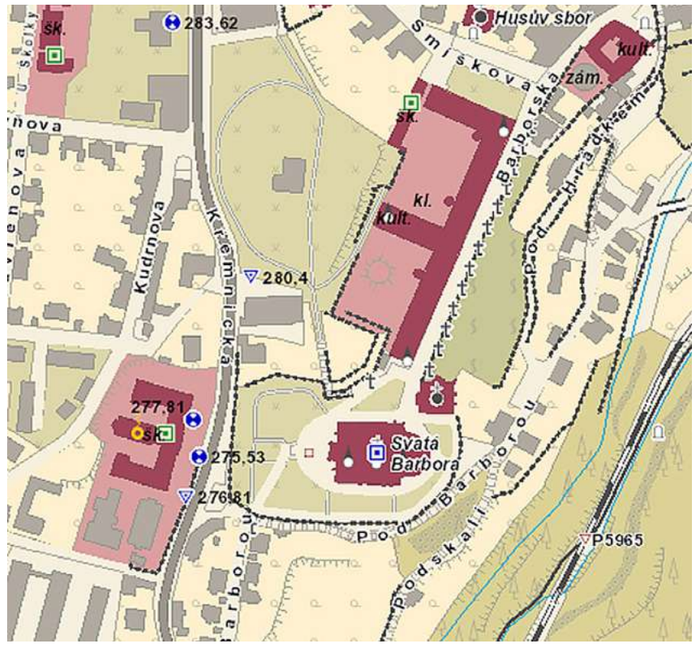
The Fundamental Base of Geographic Data of the Czech Republic (ZABAGED®) is administered by the Czech Office for Surveying, Mapping and Cadastre (ČÚZK) and originates from 1995 to 2004. It was created by digitising information from 1: 10 000 scale base topographic maps and, as well as position data. It contains approximately 350 qualitative attributes and descriptive information, and altimetry models – Digital Terrain Model and Digital Surface Model. ZABAGED® is also the base source for positional determination of orthophotos together with the information system of the real estate cadastre.

Positional accuracy of individual geographic objects within ZABAGED® varies from 0.14 metres to 1 metre. Objects that are difficult to identify, such as forest borders, are digitised approximately using orthophoto and airborne laser scanning data. The comprehensive refinement of position data will enable their positional adjustment to the highest accuracy.

Descriptive and qualitative information is obtained from the owners and administrators of individual objects, or are collected in the field by ČÚZK surveyors. How up to date this information is varies significantly, however many datasets are updated and verified in cooperation with primary object and information administrators at least once a year. ČÚZK completes the revision of the entire ZABAGED® content over a four year period.

The present trend in the Czech Republic is to develop integrated geographic systems. ČÚZK strives to develop computer-supported interfaces for data migration between information systems of the public administration, including online web services for delivery of updated information from thematic information systems.

ZABAGED® is provided to users as datasets and web services. Web file services or web map services meet national specifications, as well as the standardised INSPIRE product specifications formats. Derived and generalised ZABAGED®-based 1: 50 000 and 1: 250 000 scale data is provided as open data under the licence CC BY 4.0. Following the new Directive of the European Parliament and Council EU 2019/1024, on open data, ČÚZK is also preparing the publication of ZABAGED® as open data, the first step being the implementation of this Directive into the Czech legal system.



Denmark

New National Data Distributor in service

The Agency for Data Supply and Efficiency (SDFE) works to create a core part of the data foundation for growth and development in the Danish society.

SDFE is in charge of collecting, managing and making available public-sector data to Danish decision-makers, businesses and citizens.

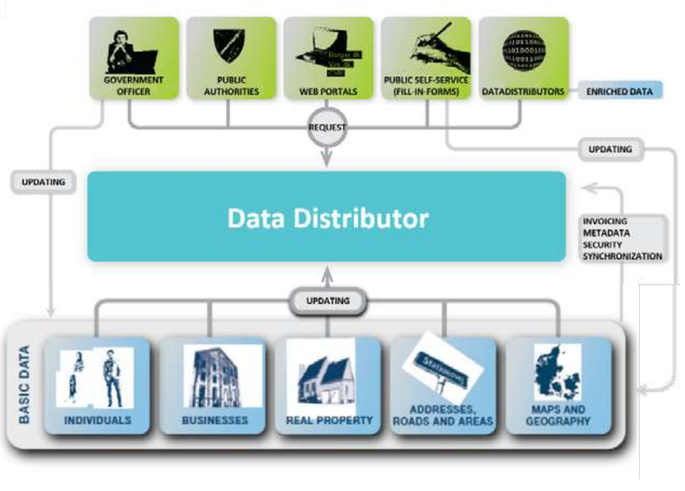
Over the last years, SDFE has been in a transition from a traditional mapping agency to a data agency, recognising the value of combining geospatial data with other data sources.

SDFE is a key contributor to the Danish Digitisation Programme, and through the Basic Data Programme responsible for the national Data Distributor. Providing services for geospatial data has proven to be a relevant foundation and experience for handling the responsibility implementing the Data Distributor, which provides public-sector geodata as well as data from other domains.

This one-stop distribution channel, gives access to a range of interoperable basic public data, ranging from information about individuals, businesses and real property, to geospatial data on buildings.

At the end of 2019, the Data Distributor was implemented, and thereby went into operation. It marked the end of a challenging and exiting journey. The Data Distributor now allows public authorities, utilities as well as private companies to centrally collect, combine and apply basic data for the benefit of the Danish society. During 2020 it is planned to support the eIDAS regulation, which will allow EU/EEA users with an eID, to access data and services on the Data Distributor.

SDFE is committed to open data – and has analysed its economic value, demonstrating how open data multiplies the number of users and the value for society. With the Data Distributor, Denmark is now sharing the high quality authoritative Basic Data available, providing the foundation for digital transformation. This will support the creation of innovative and coherent digital solutions across the public and private sector.



Denmark

Improvement of information about the coastline

Increased use of the cadastral map also requires quality improvements in terms of information about the coastline.

In Denmark, the coastline is constantly changing because of natural growth and reduction. The Cadastre contains more than 7,300 km of coastal boundary lines and many do not match the actual coastline. This is a problem for users of cadastral data.

Only chartered surveyors can change coastal boundary lines in the cadastral map. However, before a change can be registered, a request from the landowner and a signed declaration is required. Furthermore, the landowner has to pay all the costs.

The Danish Geodata Agency launched a test project in 2018 to provide useful information about improving the quality of coastal boundary lines without any cost to the landowners. The project included 41.1 km of coastline and 78% of the real properties participated (135 out of 172). As a result, it is necessary to make changes in the Act of Subdivision if all coastal boundary lines are to be corrected without accept from the landowners.

Improving the Danish Cadastre by optimising data quality and use

One single registration system for all real property.

The Danish Geodata Agency has made it easier to access and improve data by collecting information for real property and condominiums in one single registration system. The move is part of its focus on improving methods and procedures to help ensure optimal quality and multiple uses of the data.

In 2019, the Danish Cadastre took over the basic registration of condominiums from the Land Registry. The handover is part of Denmark's Real Property Data Reform, where the basic registration of all real property types will take place at the Cadastre as the authoritative register.

To meet user need for harmonised property information that is available and accessible via interoperable networks, a new unique property identification called the BFE-number has been established and is used in the property registers. This makes it possible to re-use data in the Cadastre, Building Register, Property Ownership Register and Land Registry.

In February 2019, the Danish Geodata Agency received data for 337,199 condominiums from the Land Registry, and since then has registered 5,000 new condominiums. All have been provided with a BFE-number.

Private licensed land surveyors prepare the data for new condominiums, including changes to condominiums. They deliver the data to the cadastral authority for registration upon scrutiny of the legal basis for the proposed changes. The data then continues to the Land Registry Verification Loop to ensure that an approved and registered change will not be in violation with a registered ownership or mortgage.

Estonia

Improving data quality to support preparations for the 2021 census

The Estonian Land Board's Address Data System (ADS) fulfils a vital social function and will also play a pivotal role in the forthcoming population and housing census.

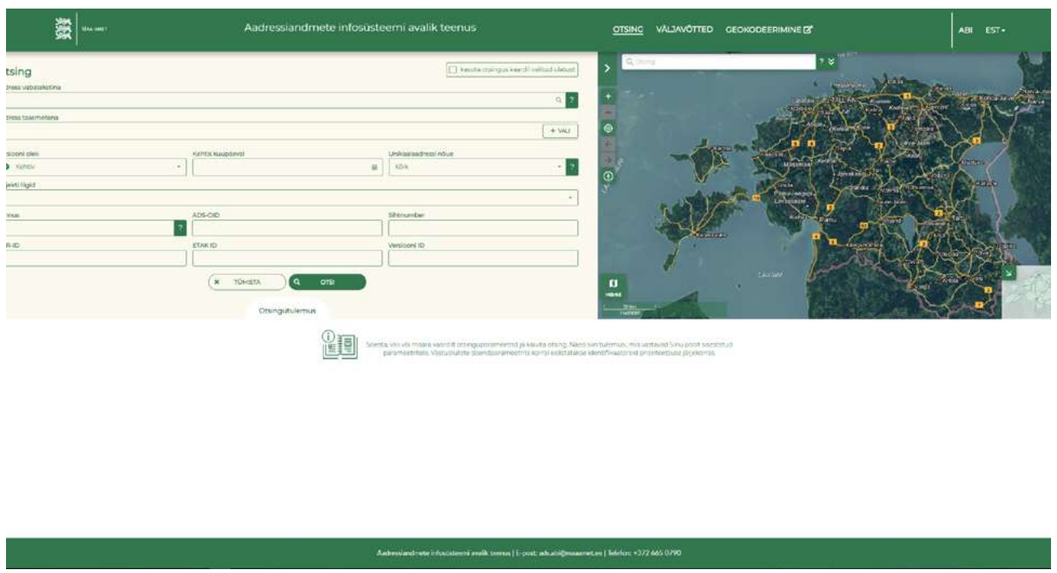
The census takes place in 2021 and will mostly be based on data from different registers. It is therefore important for the data to be accurate, complete and up-to-date. The Land Board is collaborating with other institutions to prepare by improving the data quality and efficient use of all relevant databases.

The Land Board helps to improve data quality by providing additional information. This includes updated orthophotos and linked data for other registers such as the register of construction works, population register and business register.

In addition, it is coordinating the efforts of local governments in improving address data quality. In 2019, data for more than 60,000 objects, mostly the addresses of residential buildings, were fixed. This helps to eliminate cases where a substation, shed or garage has been registered as a place of residence, or the residential building is no longer standing.

All proven residential or work buildings are assigned a unique address by the local governments who are supported by Land Board specialists, its X-GIS map application and photo warehouse. It is essential that the information is collected only once and then reused, and to ensure that changes made in one register are automatically made in the other registers.

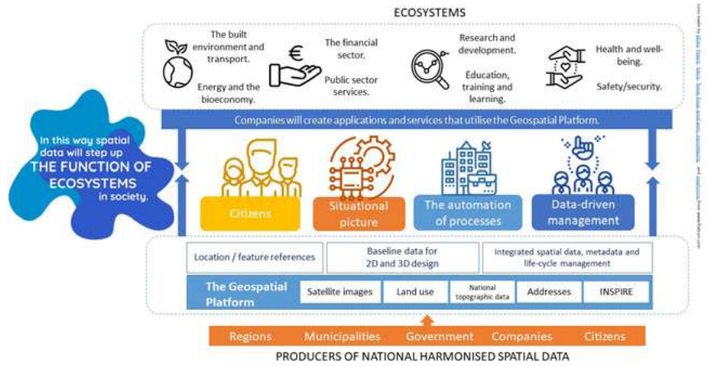
The Address Data System contains more than 2.4 million objects, including 1.1 million buildings, 526,000 apartments and 692,000 cadastral parcels. For viewing the Estonian address data, a new public service at **xgis.maaamet.ee/adsavalik** was created.



Finland

Finland's geospatial platform enables management of data from different providers

Finland's new geospatial platform enables the management of distributed data sources with work now taking place to include 3D data and addresses.



The three-year government project, which was completed at the end of 2019, was a collaboration between the Ministry of Agriculture and Forestry, the Ministry of Environment, the National Land Survey of Finland, and the Finnish Environment Institute. The services are now available at **beta.paikkatietoalusta.fi**.

The focus of the platform is to manage the quality and lifecycle of distributed data from different data providers, such as municipalities, using common data models as a basis. Data models are now available for buildings, road network, hydrography and addresses, as well as a pilot for land cover and use. In addition, the Government has started a new project to establish a new building platform and register for Finland.

The key services developed in the geospatial platform project include;

1. A quality guard which allows automated quality checking of the logical consistency rules for municipal buildings and regional plans.
2. An upload service and life-cycle management for municipal building information.
3. National INSPIRE implementations.
4. A crowdsourcing application for collecting building entrances and waypoints, and for reporting possible errors.
5. National redirection service.
6. National geospatial search using the different names by which a place is known as well as the contents of the national registries which have been implemented. It also supports general search engines such as Google.
7. A table Joining Service for edge-matching data.
8. Data cards for geospatial names with linked data.
9. New data viewing services: National Land Survey of Finland maps with vector tiles; and national satellite mosaics based on Sentinel 1 and 2 images.
10. New data download services based on OGC API Features.
11. A geocoding service based on addresses, geographical names, cadastral IDs and map sheets.
12. The Suomigrammi Dashboard which enables users to access, geospatial statistics from the platform.
13. An indexing service pilot to manage buildings and addresses by administrative and statistical areas.

National Land Survey of Finland is now continuing the development of the National Topographic Database and the new address register which are part of the platform. A key target is to add municipality data, correct data according to the new data model and to create new 3D building data for all of Finland. This will be based on new laser scanning which started in 2020.

France

An observatory for reliable monitoring of soil artificialisation

A better understanding of the phenomenon of soil degradation and promoting awareness of these issues is the dual objective of the artificialisation observatory in France.

The initiative is implemented under the supervision of the Ministry of Ecological and Solidarity Transition, to which National Institute of Geographic and Forest Information (IGN) contributes.

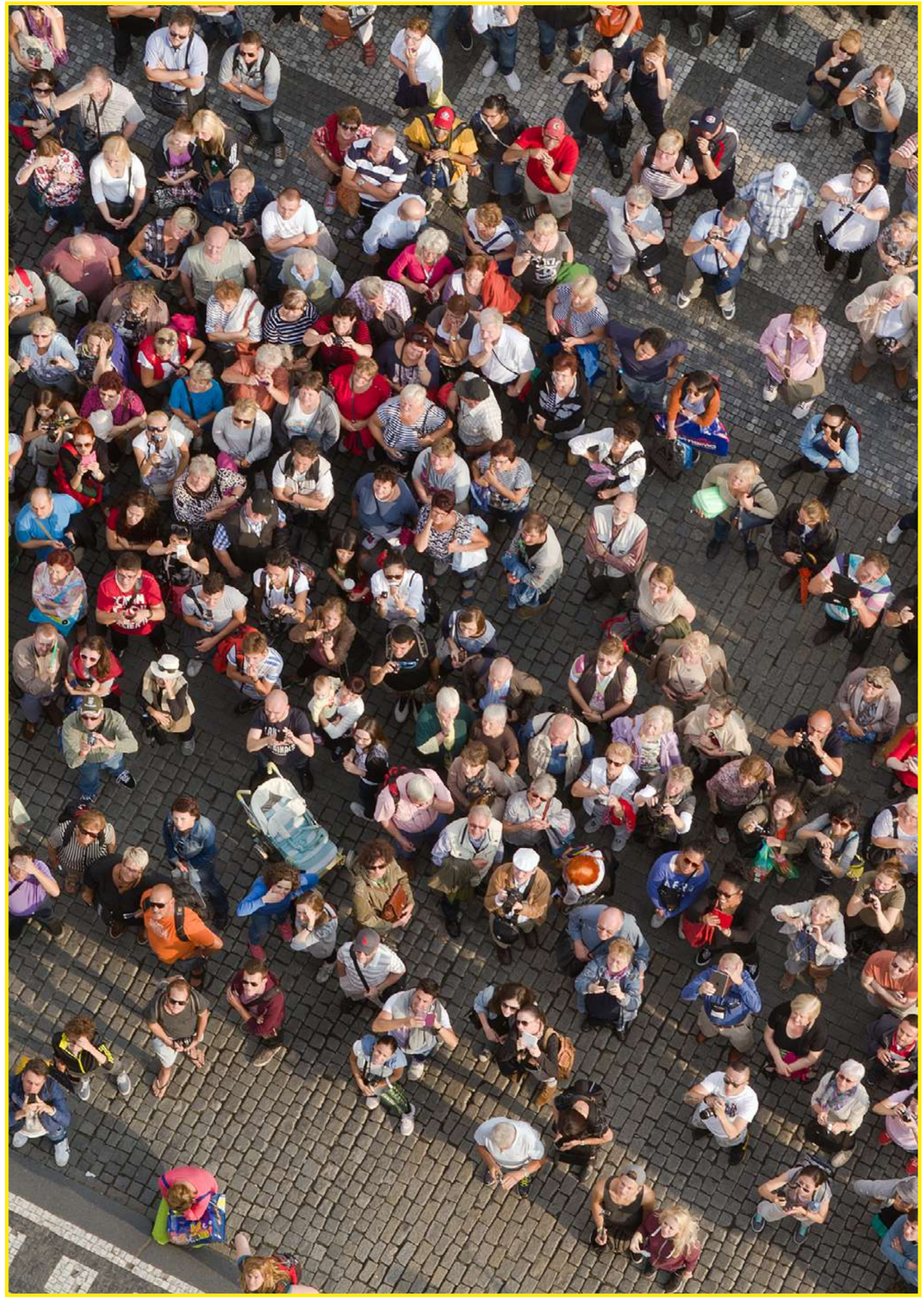
The national biodiversity plan of July 2018 has the unprecedented ambition of developing an inventory of the use of space and providing territories and citizens with soil degradation data under comparable territorial scales published annually. It also includes the need to define the time horizon to achieve the objective of zero net artificialisation.

Within the Plan's framework, the Ministry of Ecological and Solidarity Transition launched a national reference system in July 2019. As the display portal, the observatory of soil, managed by IGN and other national agencies, provides data to measure the consumption of natural agricultural and forest areas.

Anyone can access the information, which includes a cartographic tool displaying binary artificialisation flows (artificialised/ non-artificialised), computed from the land files of the Cadastre. Large-scale land cover and land use data will provide better resolution than the current land parcel, as well as richer nomenclature (beyond the binary). These data will be available for download.

To deliver the data, IGN is first building a framework from existing data, which is updated regularly. Then, based on training data, a deep learning process is initiated on orthophotography and satellite images. The multitude of objects detected, such as forests, meadows, buildings, parking lots and vines, will be distributed by land use classes through a vectorisation and aggregation process. This benchmark data will allow stable monitoring of artificialisation covering the entire territory with an update rate of three years, at sustainable costs, and available as open data.

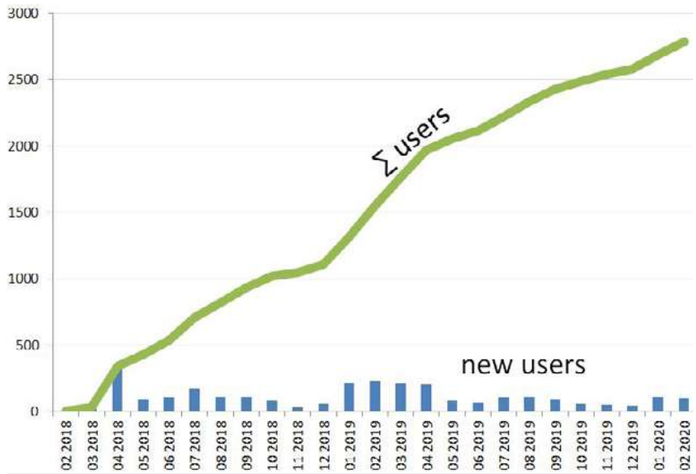
Prototyping is underway in the city of Arcachon in the Gironde with a deadline of June 2020 when national implementation will be decided. The challenge is ensuring that data meets user expectations, adjusting the specifications to the definition of artificialisation, and producing data in the most automated way possible from aerial shots taken in 2015 and 2018, as well as satellite images, through deep learning to achieve a partition of the territory into homogeneous plots.



Germany

Enabling smarter farming in Germany with open data satellite positioning service, SAPOS®

SAPOS®, the satellite positioning service operated by the surveying authorities of the Länder of the Federal Republic of Germany (AdV), is now available free of charge and being used extensively for smart farming.



Tractors using SAPOS® / NRW

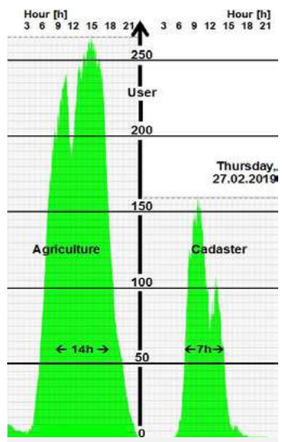
The 2017 conference of the agricultural ministers of the German Länder was the starting point for a new SAPOS® user group and the demand for open data with the goal to use SAPOS® for smart farming. As a result, almost all German Laender provide SAPOS® free of charge to the agricultural sector or as open data for all users.

In North-Rhine Westphalia (NRW) for example, SAPOS® became available as open data in April 2018 and today it is used in almost 3,000 tractors. This is a significant change in user behaviour as the agriculture sector starts much earlier in the morning and works even longer than the 'classical' surveying community.

SAPOS® provides the official spatial reference for everyone using modern technology. The service is considered an infrastructure basic provision and is part of the legal remit of the German authoritative survey with AdV and the BDVI, an association of about 1,300 publicly appointed surveyors in Germany, having an official agreement to use it. SAPOS® has been registered since 1997 and the brand is well-established nationally.

SAPOS® enables users to save a temporary reference station to solve spatial reference tasks more economically and efficiently. It is based on a network of around 270 GNSS reference stations which are operated by AdV.

SAPOS® correction values are available to the user in real-time and for post-processing. This service is widely available with high reliability and comprises three service areas with different properties and accuracies: SAPOS®-EPS real-time positioning service; SAPOS®-HEPS high precision real-time positioning service; and SAPOS®-GPPS geodetic post-processing positioning service.



User behavior / NRW

SAPOS®-HEPS allows a position to be determined with an accuracy of 1 to 2 cm to meet the requirements of legally secure real estate surveys carried out by publicly appointed surveyors in Germany.

Germany

Delivering free, seamless, cloudless mosaic images of Europe to the world

In Germany, the Federal Agency for Cartography and Geodesy (BKG) delivers high quality remote sensing products as open data.

Remote sensing through satellite imagery is an important source and method for specialised services provided by BKG, such as surface models for air traffic control and landcover changes for spatial planning. These and other satellite products are important contributions to issues of public relevance, for example civil security and environmental monitoring.

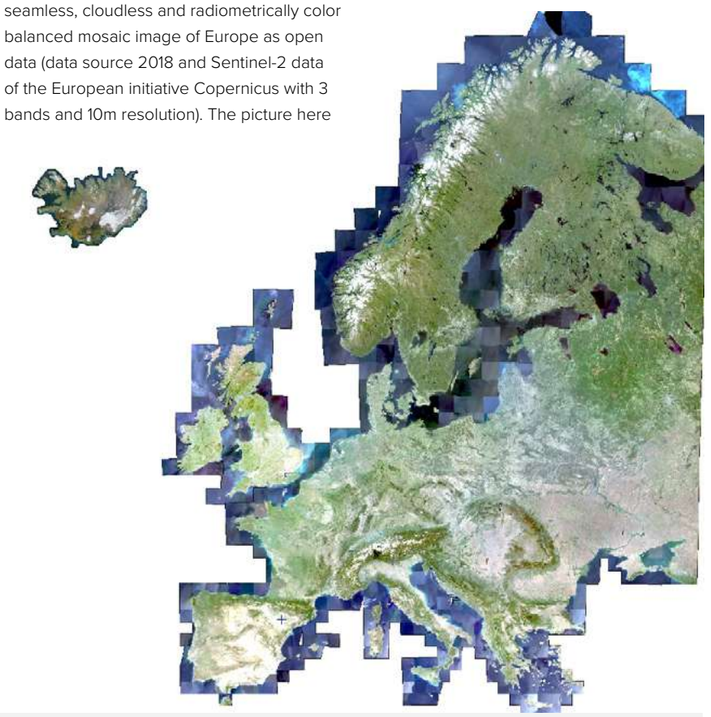
BKG has established a process chain for high quality mosaics that allows for the harmonisation of any optical remote sensing data and for any area on Earth. This is particularly beneficial to the Federal Administration in Germany and, whenever legally permitted, for the public as open data.

BKG's technologies and services allow the production of time-shifted data sets. For example, offering nationwide remote sensing data and the corresponding derived products from 2009, 2012, 2015, 2017 and 2018. Due to copyright restrictions, the first generation of these products could only be provided for internal use within the Federal Administration.

With the EU-financed Copernicus programme and the corresponding open data policy, BKG is now able to publish the derived mosaics for free. For example, a complete, almost cloudless and high-quality mosaic of Germany in 2018 and 2019 from Sentinel-2 datasets is now published as a web map service and shared on various platforms. The requests for this service are very high and still rising; from March to December 2019, it was accessed more than 8 million times with 430 Gigabytes transferred.

In addition, the established process of creating a mosaic from multiple satellite images is enabling BKG to produce a free, seamless, cloudless and radiometrically color balanced mosaic image of Europe as open data (data source 2018 and Sentinel-2 data of the European initiative Copernicus with 3 bands and 10m resolution). The picture here gives an impression of this new product which will be published in the first half of 2020.

BKG will be continue to expand the time series (past and current ones) of remote sensing data in the future. Commercial and open data will be used. BKG will continue to keep its datasets and mosaics as open as possible.


Mosaic image of the entire Europe (2018)

Hungary

Improving efficiency, transparency and data access through e-services

Hungarian cadastre, remote sensing and GIS professionals are delivering e-projects to improve efficiency and provide information to the public through the new Lechner Knowledge Centre (LTK).

LTK has been created by the merger of two prestigious Hungarian institutes, the Government Office of the Capital City Budapest Department of Geodesy Remote Sensing and Land Offices – former Institute of Geodesy Cartography and Remote Sensing (FÖMI) – and the Lechner Knowledge Centre.

The e-Land Registry project aims to improve the competitiveness of the Hungarian economy by reducing land administration transaction times. It will increase the electronic procedures for citizens and other stakeholders through the creation of client-oriented, electronic land administration services with new e-solutions and communication channels. An additional benefit will be the electronic reorganisation of land administration proceedings, not only to improve efficiency but also to increase transparency through automated decision-making mechanisms.

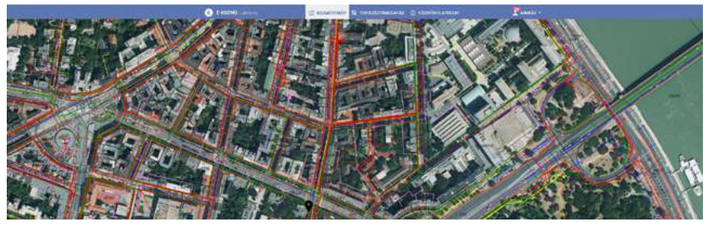
Development started in 2019 and is expected to finish at the end of 2022. The new system is expected to start in autumn 2022. A data cleaning program using artificial intelligence is also included in the project activities to ensure the creation of an up-to-date, reliable database in three to five years' time.

E-utility is a national register of public utilities implemented with web-based technologies, such as map visualisation and geospatial information supply. It enables the reconciliation of data from public utility service providers following official authentication at **e-epites.hu/e-kozmu**. Following the INSPIRE guidelines, e-utility has been available to the public since July 2017 and has been fundamental in concluding more than 230,000 cases.

In Hungary, planners, designers and architects have to consult public utility companies before building and construction works. Planning and design must take into account information received on the location and positions of public networks. E-utility enables this to be done electronically to reduce administrative burdens and bureaucracy that may limit business activities and citizen requests.

The system is built on the registers of the public utility providers (about 900 electricity, hydrocarbon, water supply, drainage, telecommunication and district heating network providers) through real-time Web Map Service (WMS) and Web Feature Service (WFS) technologies, Public utility networks are shown on the e-utility map interface, which is based on Open Street Map, but also incorporates basemap layers from the land registry and the National Orthophoto Database.

The system is currently under development to ensure support for field construction works in the near future via location-based Augmented Reality mobile application.



Iceland

Iceland launches its first open Digital Elevation Model

High resolution, high accuracy height data is now able free of charge thanks to a collaboration involving the National Land Survey.

Working with the Icelandic Meteorological Office and the Polar Geospatial Center, University of Minnesota, it has used new techniques to integrate high resolution and open Digital Elevation Models (DEMs) from the ArcticDEM, into new National Data, as well as combining it with existing lidar data, mainly from glacial areas. The methods developed are highly automatised and use adjustments of the individual DEMs, as well as robust mosaicking of the ArcticDEM, to take advantage of the multi-temporal data available. As a result, Iceland has now launched it first free of charge, high resolution (2x2m), high accuracy (>1 m accuracy in elevation) DEM.

The resulting country-wide DEM mosaic has numerous applications, from geology to hydrology and land management. The coloured image below shows an application involving comparisons between DEMs, resulting in maps of elevation differences. The result shows the disappearance of the Ok glacier in 2014, by comparing the ArcticDEM with a DEM based on aerial photographs from 1978. The glacier was defined as 'extinct' in 2014.

Find out more at **atlas.lmi.is/dem**.

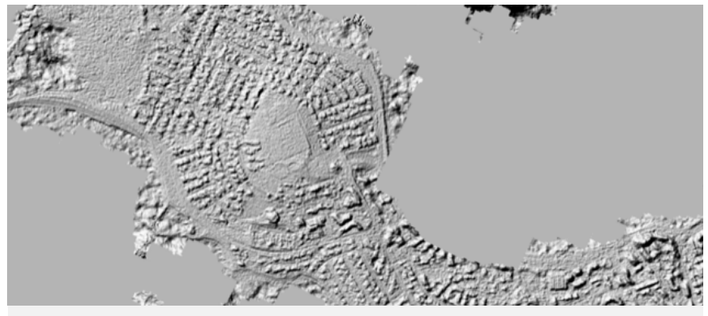
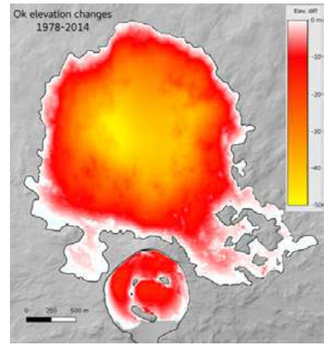


Figure 1 Original ArcticDEM strip on the Reykjavík area

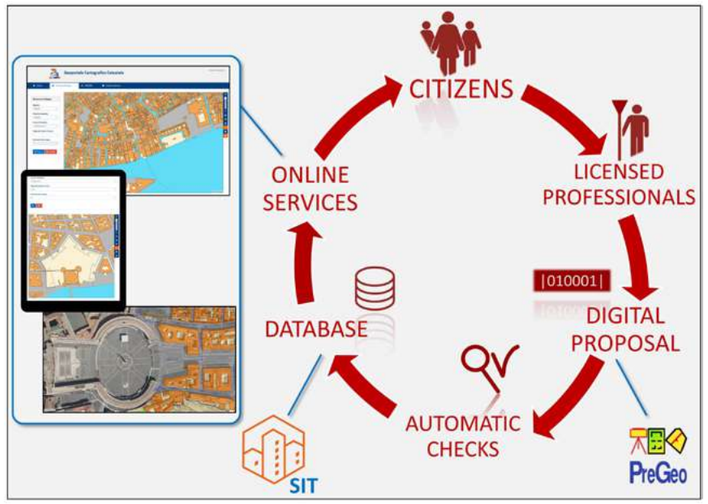
Figure 2 Mosaic, using a median value of all possible DEMs at each cell location



Italy

Automatic update and dynamic online cadastral cartography services in Italy

Automatic updates account for 90% of all submissions to online cadastral services in Italy, demonstrating the power of citizen participation to public services.



Updating of the Italian Cadastre is carried out by licensed technical professionals who submit their changes to the cartographic, land and urban census and archives through a 24/7 IT system known as Pregeo (GEOmetric PREprocessing). This allows the management of survey data and the automatic recording on the database. A management and control system checks the proposal and, if correct, updates the archives notifying the professional of the result.

Along with the updating system, the Italian Revenue Agency, of which Cadastre is part, is evolving the entire Cadastral Information System into a modern webGIS. The Integrated Land Information System (SIT) is based on the cadastral cartography. In addition, the unified management of the technological infrastructure and integration of data, processes and quality control is helping to improve the cadastral, land registration and real estate-estimation services archives.

In 2019, as part of the implementation of the INSPIRE Directive, the Revenue Agency launched its service to provide cadastral cartography, without charge, through a WMS view service and the Cadastral Cartographic Geoportal, based on the SIT database.

The cartographic and census variations generated through the updating process currently appear within the SIT database within 24 hours. When the SIT is fully operational by the end of 2020, any cadastral variation submitted by a licensed professional and automatically processed, will update in real time and be immediately available through the online services.

Users can monitor the updating of the cartographic database, which is fully transparent, and can also consult daily updated interactive graphs reporting the use of online services in the data and statistics section of the Geoportal. The system demonstrates the benefits to citizens, professionals, public administrations and enterprises in using cadastral maps through online services and is part of the Agency's commitment to constant improvement, both in terms of data quality and in opportunities for use through increasingly advanced services.

Kosovo

Providing official, unified addresses in Kosovo

The Kosovo Cadastral Agency is responsible for creating the national system of unified addresses.

Implementation, which is based on the EU INSPIRE Directive, started in 2010. The electronic system consists of more than 22,000 digitised roads, more than 430,000 digitised entrances, road names, and address numbers placed on pillars and walls. Under the Law on Address System, the address data are free of charge for anyone and can be found for search and view through the state geoportal, **geoportal.rks-gov.net**.

All public institutions must use the official addresses and, as a result, the network of stakeholders is large and covers not only Kosovo but also international users.

During 2019, the Kosovo Cadastral Agency signed cooperation agreements on the use of official address data with international web mapping and navigation technology companies Here WeGo Maps, TomTom and Open Street Map. The agreements are the result of the creation of a digital, advanced and accurate unified address register that meets their high quality controls. Official address data from Kosovo will now be used to update the maps in each of the platforms.

Lithuania

Accurately calculating market value of property in Lithuania

In Lithuania, mass valuation of land and buildings is being improved through geographical information systems (GIS).

The State Enterprise Centre of Registers has been performing mass valuation of land and buildings for more than 15 years. Valuation results play an increasing role in the national fiscal and social policy. Average market values are used for setting land and real property taxes, rent of state-owned land and other property, property registration and inheritance taxes as well as for granting social assistance. Approximately, 2.4 million parcels and 4.1 million structures are assessed annually. In 2019, the value of all registered and assessed real property in Lithuania amounted to more than 109 billion euros.

Information about real property transactions stored in the database of the Centre of Registers, data of the Real Property Cadastre and Register, the Address Register, as well as spatial datasets publicly available from various institutions, are used for the valuation of land parcels and buildings. Using GIS, the data are integrated into the systems of the Centre of Registers and enable valuers to determine the factors which affect value of property and to calculate the average market value more accurately.

Every year, land parcel data used for valuation are updated taking into account the protection zones of power lines, gas and oil transmission pipelines, flood-meadows and dry meadows, where restrictions on activities apply. Using GIS, additional qualitative or quantitative factors are identified, which make valuation models more precise and ensure more accurate valuation of parcels. There are also plans to introduce additional spatial parameters. Solutions of master plans obtained from municipalities are also used for valuation.

One of the key factors affecting value is a location factor reflected in the established value zone. In 2019, 1,349 established value zones for 99.33% of parcels (by coordinates and address point) and for 93% of buildings (by address point) were defined by geographic location on the map.

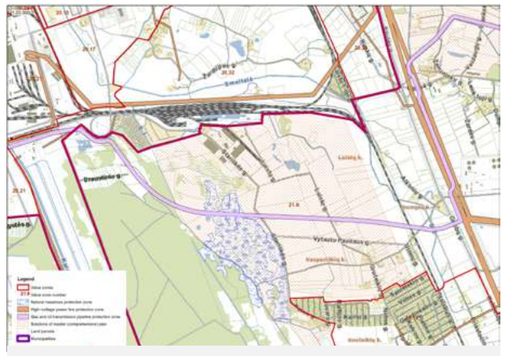


Figure 1 Protection zones of power lines, gas and oil transmission pipelines, flood-meadows and dry meadows, solutions of master plans

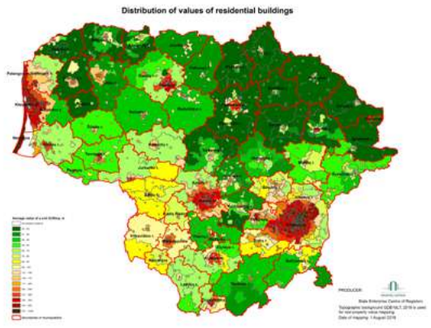
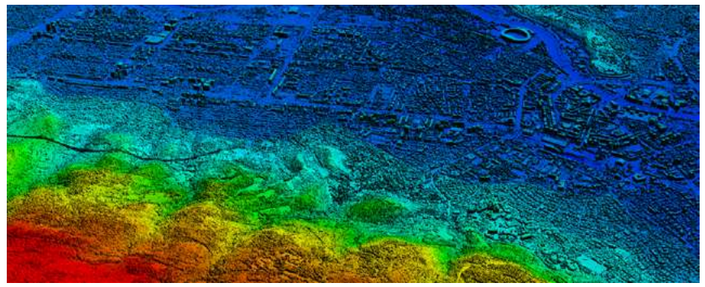


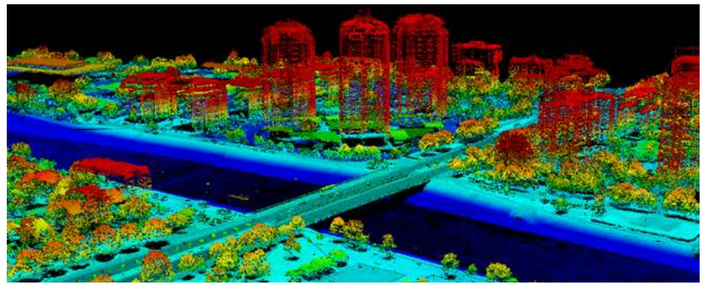
Figure 2 Distribution of values of residential buildings in Lithuania

North Macedonia

Delivering large-scale spatial, real estate and street data projects

The launch of three large projects marked a productive year for the Agency for Real Estate Cadastre of Republic of North Macedonia (AREC).



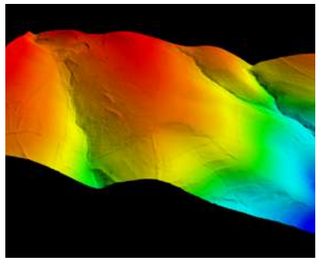


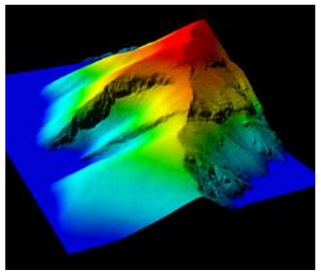
In 2019, AREC worked on delivering the Project for laser scanning of the territory of Republic of North Macedonia (LiDAR Project) funded by the Norwegian Regional Cooperation Programme. To establish an efficient LiDAR data system, the territory was laser scanned, and an accurate digital elevation model prepared for the northern part. These activities will continue in 2020 with the development of a LiDAR portal which will enable users to browse, select and download LiDAR data.

The final goal is to prepare an accurate digital model (DTM and DSM) of the entire state territory which will be widely used to realise many different projects including crisis management, physical planning, environmental protection, geodesy, infrastructure, agriculture, forestry, and defence.

AREC has also taken on a new project, the registry of foreclosed real estate for sale, a component of the upgraded eKat system. The data contained in the Registry meet the needs of investors and purchasers by providing a one-stop service for correct information about the real estate available. In 2020, AREC will continue to maintain this Registry in cooperation with entities foreclosing real estate through the procedure of claim collection or other bases.

The establishment and management of the graphical registry of streets and house numbers is the responsibility of AREC and will contain all necessary spatial and descriptive data. The first steps were completed at the end of 2019 with data collected from 10 municipalities under the competence of the City of Skopje. The activities for on-site collection of spatial and descriptive data on the territory of 11 municipalities will continue throughout 2020. The data are collected, controlled and checked to ensure correct standardisation and quality.

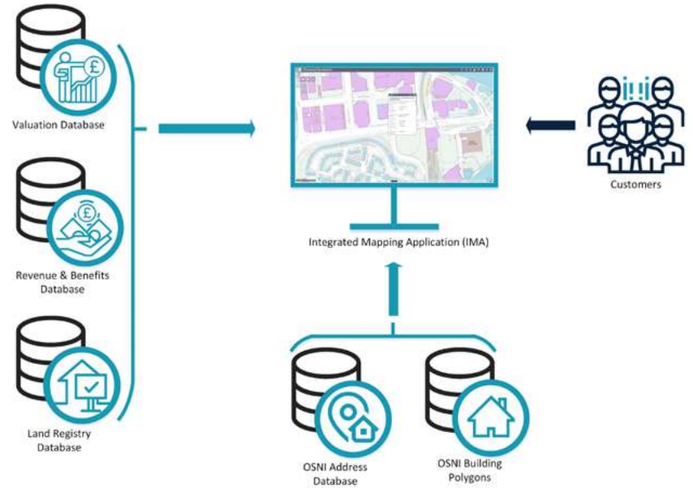




Northern Ireland

Providing a single view of land and property in Northern Ireland

Ordnance Survey of Northern Ireland mapping data has been instrumental in joining up disparate datasets creating a single view of land and property information in Northern Ireland for the first time.



Land & Property Services (LPS) was formed by the merger of four former agencies: Ordnance Survey of Northern Ireland (OSNI), Land Registry, Valuation Agency and Rates Collection Agency. The aim of the merger was to realise efficiencies in service delivery via a single land and property service organisation. LPS plays a vitally important role in supporting economic development in Northern Ireland including collecting approximately £1.3 billion of rates revenue helping fund vital public services.

Due to the services provided, LPS has a wealth of data relating to land and property within Northern Ireland. However, this data is held within separate line of business legacy systems which has prevented it from being shared across the organisation to improve decision making and ultimately the services that are delivered to individual citizens.

OSNI initiated a project to investigate if it would be possible to create a single point of access for this land and property information to serve business needs across the organisation.

They have used their mapping and address data as the framework for joining these disjointed datasets together to create a single view of all the relevant data. They have also developed an innovative prototype where staff within LPS can search for information on properties, see the spatial extent of the property on a map and view associated attribute information such as the authoritative address, land registry ownership, valuation and rating information. The user can then easily query or compare their selected property in relation to similar properties within the same geographical area.

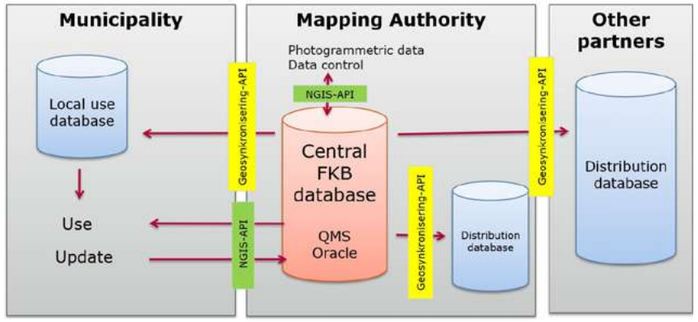
The integration of this data within a single application is already starting to show many organisational benefits. Staff are able to swiftly locate the core information relating to a single property – assisting them with delivering their daily work tasks. This is not only saving time but is also aiding staff to make better informed decisions ensuring that the citizen is getting the correct information at the right time.

The outcomes of this project will be used by LPS to help inform an ongoing digital transformation programme within the organisation to improve service delivery to clients and citizens.

Norway

Providing easier access to more up-to-date and quality-assured data in a centralised national database

Directly updating detailed map data in a centralised national database is providing easier access to more up-to-date and quality-assured data for all in Norway.



Showing the dataflow of the system. When municipalities update the central database using the NGIS API, the local copy is immediately updated using an API for geosynchronisation.

The Norwegian State is investing in digitisation of public services and internal work processes to renew, simplify and improve management. Effective cooperation between state, municipal and private organisations has been crucial to establish a more effective and accessible management solution for the most detailed map data.

Until 2016, management of detailed map data was based on the exchange of files between municipalities and the Norwegian Mapping Authority. Each municipality updated their own database, while files they submitted once or twice a year were saved to copy databases for further use by national agencies.

Today's solution, which is now entering its final project year, provides one centralised national database where municipalities update their data through an open API, based on the national standard for synchronising geographic information between computer systems to keep the distribution systems up-to-date. This system is based on a model-driven architecture that requires data managed in the system to be extracted directly from Unified Modelling Language (UML) models in the data specifications.

Detailed map data includes nationwide data for terrain, water, land resource, land use, buildings, roads, railways, wiring and other structures. The work to collect and update detailed map data is organised through a collaboration between several public organisations which have a great need for data and are data producers. Partner institutions include municipalities, the Norwegian Mapping Authority, the Norwegian Public Roads Administration, agricultural authorities and power suppliers.

The collaboration is unique as participation is voluntary and based on individual partners' perceived benefit, not legal requirements. All the organisations involved can cooperate, regardless of their management level in the public hierarchy, to update map data into one common central national database with multiple users connected at the same time. Services for accessing the data (WMS and download services) are updated daily so that all users have access to continuously updated data. The national geoportal is used to distribute data and services.

Poland

Responding to user requirements with practical network services

Poland's Head Office of Geodesy and Cartography (GUGiK) is continuing to deliver helpful and practical network services for users.

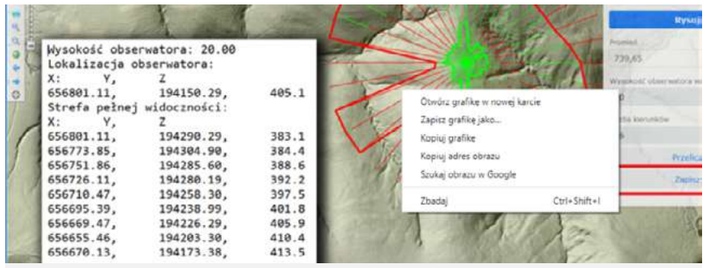
By creating integrated services, it is better responding to user requirements by providing easy access to highly detailed innovative geoinformation through the **geoportal.gov.pl** website. More than 500,000 users visit the portal every month.

In 2019, GUGiK introduced a number of integrated view services.

KIEG, the National Land Registry integrated view service, provides the ability to generate a map of land and building registry information for any area of the country directly from county databases. KIUT is National Integration of Terrain Utilities view service, which enables users to generate a map showing utilities for any area of the country, and KIBDOT is the view service for the National Integration of Topographic Objects Databases.

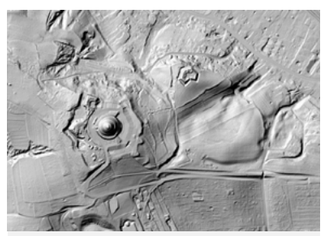
All the services, which have a simple interface and are widely available for official as well as commercial use, are very popular. For example, the monthly number of calls to the KIEG service already exceeds 150 million. The majority of visits are the result of the use of the services in the **geoportal.gov.pl** website, but their use by other state and commercial systems is also increasing. All these services form the basis for a comprehensive study such as base map.

Example of integrated KIEG, KIUT and KIBDOT service



Example of the visibility analysis

In addition, GUGiK has developed WMS and WMTS Services to present altitude data in shading form. Currently, services are based on altitude data in the grid (1 m x 1 m) obtained from airborne laser scanning.



Example of analytical shading in DTM visualisation

The DTM also connects useful visualisation and analysis tools which are available in the national geoportal, for example allowing analysis of visibility along a given line or analysis of area visibility.

Portugal

Increasing the use of spatial data in Portugal with user-friendly portal

State-of-the-art technology has been used to develop a more user-friendly geoportal to help increase the use of Portuguese spatial datasets.

Strategic and technological restructuring of SNIG, the Portuguese national spatial data infrastructure (SDI) which is coordinated at operational level by the Directorate-General for the Territory, (DGT), started in 2015. As well as offering a more dynamic and user-friendly interface, the new SNIG GeoPortal also formalises the creation of the National Register for Geographic Data (RNDG).

The creation of the RNDG, which is intrinsically related with SNIG development, improved and consolidated the metadata catalogue content, allowing more efficient searches and more effective results. New functionalities were developed for the RNDG to improve searching and visualisation of spatial datasets.

The new SNIG platform is built on Open Source technology and was developed using several modules from different open source packages (Table 1). The integration of these components was made through their APIs.

The SNIG GeoPortal interface has been customised to optimise search and access to geographic information, and plug-ins have been created to extend GeoNetwork capabilities. Several changes have been made in the GeoNetwork Core to allow searches only in datasets, however support for other types of records, such as services, was kept. A schema plugin for the Portuguese Metadata Profile was created to apply its specific rules and structure in the catalogue metadata.

As a result, INSPIRE implementation in Portugal, supported by the new SNIG, can now use a more intuitive and well-organised platform. It is also expected that more public organisations will register their spatial datasets in this platform and the number of users will consequently increase.

In addition to development of the SNIG, DGT has delivered full coverage of Portugal's mainland with orthophotos at a 25 cm spatial resolution and a new Land Use Land Cover map (COS2018). Both follow an open data policy. New technical specifications for the Portuguese reference cartography were adopted and are already in use, and a decree-law about cartography was revised and published. Three GNSS stations in the Portuguese Continuously Operating Reference Stations Network (ReNEP) were also updated to receive Galileo data.

Software	Description
Operating System	Ubuntu Server
PostgreSQL/PostGIS	Object-relational database management system for GeoPortal and RNDG. PostGIS adds support for geographic objects to the PostgreSQL database.
Drupal	Content Management System for the SNIG GeoPortal.
GeoNetwork	Catalog application to manage spatially referenced resources. Supports the National Register for Geographic Data (RNDG). Provides powerful metadata editing and search functions as well as an interactive web map viewer.
OpenLayers ReactJS	Javascript library for implementing map features in the Map Viewer.

Table 1 SNIG software

Figure 1 SNIG GeoPortal

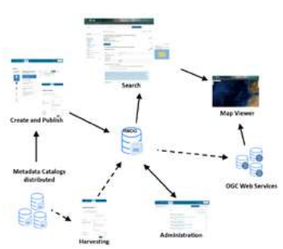
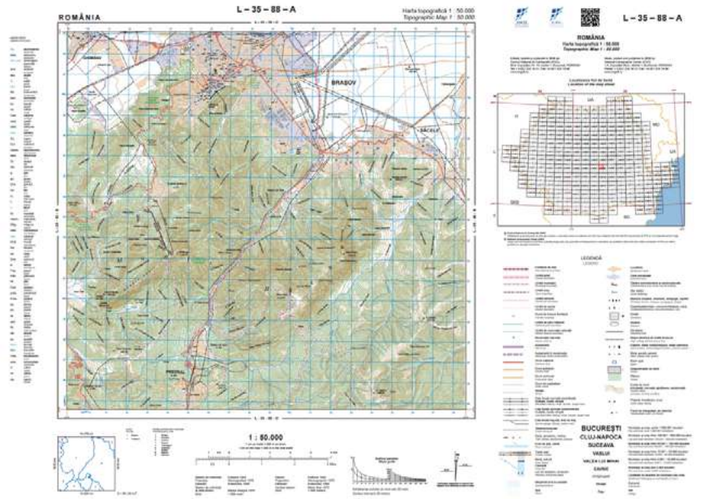


Figure 2 SNIG components

Romania

Romania's ground-breaking year focuses on better serving users

2019 was an exciting and ground-breaking year for Romania, which for the first time since its accession, held the rotating Presidency of the European Union (EU) Council.



As a result the National Agency for Cadastre and Land Registration (ANCPI) held the Presidency of the Permanent Committee of Cadastre (PCC) in the EU for the first semester of 2019.

Hosting the PCC Conference and Plenary meeting in Bucharest was a particular highlight for the Agency, offering an opportunity to contribute to the Committee's future activities. Together with the working group, ANCPI made a thorough analysis of the best way to organise the PCC to better serve the members' needs and meet their expectations. Its findings and proposals were presented at the PCC Plenary meeting held by NLS Finland during the second semester of 2019.

During the past year, ANCPI also improved the functionalities of Romania's INIS geoportal. Users are now provided with WMS services based on TopRO5 data sets, Romania's topographic reference plan in digital format, corresponding to the 1:5 000 scale, in national format. Users can create their own map by adding network services or local datasets and changing their symbology and defining information windows.

These capabilities support the central and local government in developing infrastructure projects, as well as private investors with access to geographic information that can be put together with other information of interest.

Scotland

Revealing plans for future land registration in Scotland

Scotland's Land Register is a vital national asset that already underpins the Scottish economy.

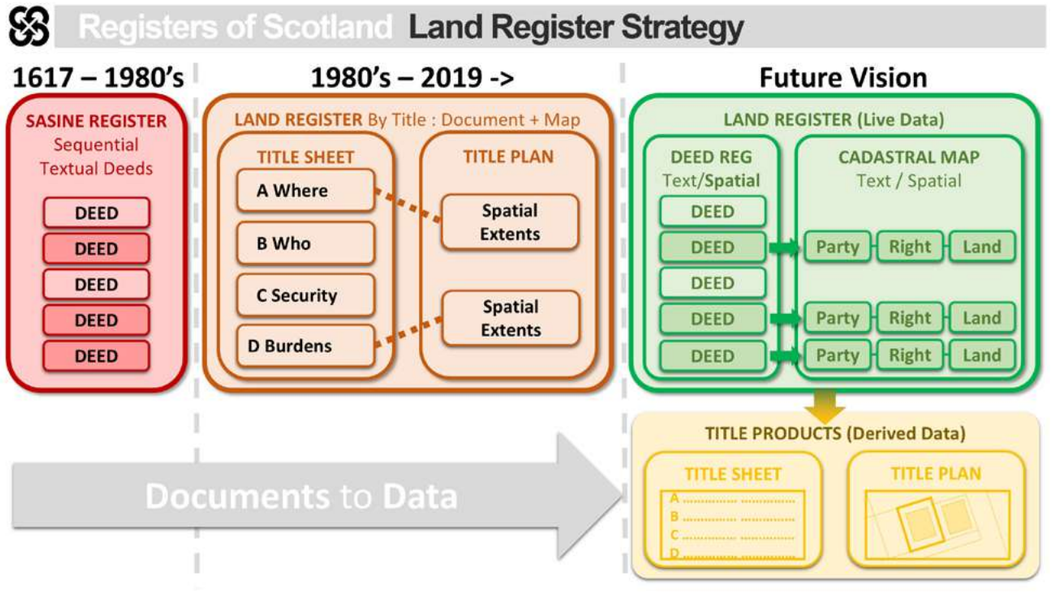
It supports a smooth and safe transaction process while improving intelligence on land and property information across Scotland.

With Registers of Scotland working towards a target of completing the Land Register of Scotland by 2024, the question now is 'what next?' The organisation is already researching its next long term strategic goal 'Documents-to-Data' – which will restructure the land register so it can best serve the future needs of the citizens of Scotland.

The aim is to capture the land register through digital deeds and associated land rights spatially, with ownership held in a structured Party – Right – Land formatted cadastral map. This structured data will then be used to derive products on demand, such as the existing customer-focused title plan and title sheet.

Holding the core information as machine-readable data should deliver significant benefits including: Improved registration times; new derivable products; better country-level intelligence; and better change intelligence.

This will allow Registers of Scotland to provide a better service to the whole land ownership ecosystem and ensure the oldest national land register in the world is also one of the most forward-thinking.



Slovakia

Creating a new Digital Elevation Model for Slovakia

Progress towards developing a new Digital Elevation Model (DEM) for the whole of Slovakia continued in 2019.

The six-year project will create the new DEM 5.0 from airborne laser scanning data. The laser scanning and following post-processing of data is carried out by private companies with quality control independently performed by the suppliers and the Geodesy, Cartography and Cadastre Authority.

Currently, 17 of the 42 localities, which are known as lots and cover the whole territory, have been completed and published via the authority's geoportal. Individual lots are scanned separately and the process of laser scanning goes from the west of the country to the east. All the products created from the airborne laser scanning data are provided free of charge.

There are three main outcomes of the project: Digital Elevation Model DEM 5.0; Digital Surface Model DSM 1.0; and Classified Point Cloud.

The project has set mandatory quality criteria such as:

> Scanning density of at least 5 points per m^2.

> Lots with 250m swath on 95% of their overlap.

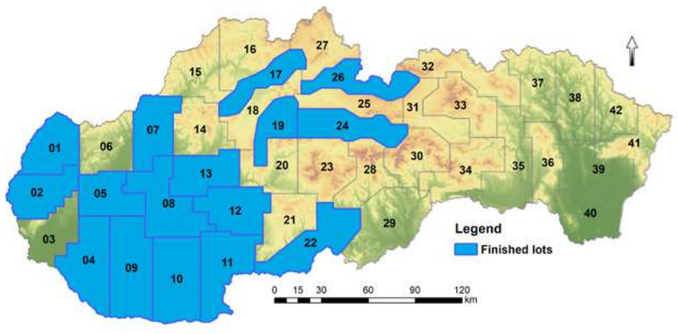
> Horizontal and vertical system: S-JTSK(JTSK03)+H_{Bpv}; ETRS89-TM34+h_{ETRS89}.

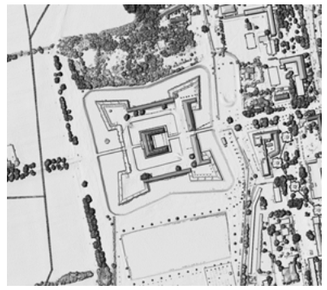
> Absolute vertical accuracy of point cloud at ellipsoidal heights ETRS89 - $m_h \leq 0.15$ m.

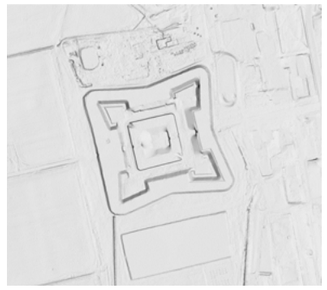
> Absolute positional accuracy of point cloud in ETRS89-TM34 - $m_{XY} \leq 0.30$ m.

> Absolute vertical accuracy of DMR 5.0 in ETRS89-h - $m_H \leq 0.20$ m.

The control of absolute horizontal and vertical accuracy is performed at geodetically surveyed checkpoints located on open paved areas at several randomly selected locations within each lot.







Spain

Updating a charter of services for citizens in Spain

The Spanish General Directorate for Cadaster (SDGC) has updated its charter of services for citizens for 2019-2022.

The Charter, first published in 2006 and regularly updated to improve services and commitments, is a fundamental document for the Quality Policy of the Cadaster. It is therefore considered a contractual relationship between SDGC and its customers and most importantly defines its commitment in terms of reducing administrative burden, improving attention and assistance and improving the quality of services.

To measure, and to improve the performance of these commitments, the SDGC uses a number of indicators that are also collected in the charter, which also outlines how any citizen can report non-compliance, as well as the remedy measures and compensations.

After a short explanation of SDGC's organisational responsibilities, it includes a list of the services provided, including citizens and user rights and how to submit complaints and suggestions. These are delivered in several different ways.

Around 500 million queries are made each year via the Internet at **sedecatastro.gob.es**. A free service offering all non-personal data is available to all. Access is restricted to personal data, with special services for registered institutions and collaborators.

The SDGC also runs a free hotline to call at any time. Inquiries that are particularly complex will be answered within 24 hours. Outside of business hours, inquiries can be made by recording a message on an answering machine and are answered the next day.

In addition, services are available at one of 3,800 cadastral information points authorised by SGDC and strategically distributed throughout the Spanish territory. These are found in different public organisations and institutions, and are particularly aimed at citizens who are unable to access cadastral information online. Likewise, information is available through the 56 management offices of the cadastre in each capital of province and in the offices of local entities.

The Charter's purpose is threefold: To inform citizens about the services provided; to let them know the general and specific rights that support them; and to inform customers of the quality commitments, as well as appropriate actions.

Sweden

Delivering data to fight wildfires and protect forests in Sweden

Geographical information and maps provided by the Swedish Mapping, Cadastral and Land Registration Authority (Lantmäteriet) are playing a key role in fighting wildfires.

Almost 70% of Sweden is covered in forest, which is a vital component for the Swedish economy. In 2014, a raging forest fire resulted in 35,000 acres of ground being burnt down. Evaluation of the rescue work concluded that there were some deficiencies in the geographic support: Lack of geodata; use of different geosupport and coordinate systems; and no ability to ensure paper maps for planning and field support.

Four years later, in the summer of 2018 which was extremely dry and hot by Sweden's standards, four major fires and 70 smaller ones ignited across the country, covering a total area of 60,000 acres.

The biggest impact of these wildfires was felt in the area of Ljusdal in the middle of Sweden and the local authorities needed extra help to manage the crisis. Knowing that Lantmäteriet provided such capability to the Swedish Armed Forces (SweAF), the county administrative board asked for GIS operators to work with the crisis management staff in Ljusdal (Färila).

The Swedish Civil Contingencies Agency (MSB) then started to coordinate the response by asking governmental bodies in what way they could give their support. Following a request by Lantmäteriet, MSB formally requested that the SweAF deployed the Geocell system manned by Lantmäteriet, personnel. The Geocell provides operation-specific support at crisis response and management sites, including geographical information and map products for managers, field personnel, and, under certain conditions, technical systems. A quick positive response made it possible to deploy the Geocell and make it fully operational at the regional crisis management headquarters in Färila after just 24 hours.

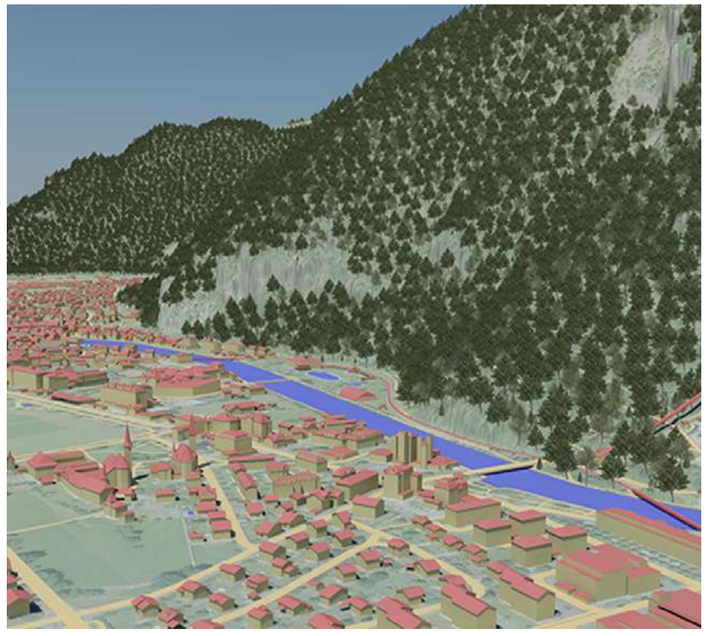
From this point, the status of the fires was put on designated maps, creating one single source of correct information. The printed maps were produced in large quantities and shared at the briefings so that everyone involved used the same relevant information. The adding of a common coordinate system to the maps made coordination of the firefighting easier and more effective.

As a result of this experience, Swedish authorities now believe they are better prepared for similar situations in the future.

Switzerland

Delivering 3D data of Switzerland

Topographic Landscape Model (TLM) is the basic landscape model for Switzerland and covers the whole country.



TLM is not a product, but the basis for a wide variety of products including the derived cartographic base maps. It is a seamless 3D dataset containing primary geometry without generalisation and with an accuracy of better than 1 metre in x, y and z coordinates for most objects, and even better accuracy for building roofs, in the order of 0.5 metre and often much better. TLM consists of nine topics or data layers which contain several dependent datasets previously maintained separately, such as boundaries, names and terrain.

TLM also has a revised extended data model to meet the needs of reference partners, such as road and water authorities or GLAMOS, Glacier Monitoring in Switzerland. All objects are stored in 3D and have x, y and z coordinates which also means that objects on the ground in TLM should maintain consistency with the Digital Terrain Model (DTM). Consistency implies for instance that the vector element of a road lies on the underlying DTM surface and vice versa. The objects in TLM have not only geometry but also different attributes.

The first concepts for TLM were defined in 2000. The development of TLM was started in 2008 using previous low accuracy cartographically generalised 2D data. The construction of TLM was completed at the end of 2019 for the whole country.

During this period the 3rd dimension was introduced to the data, and it was 'degeneralised' but, in reality, mostly intensively recaptured to a high accuracy. It was also updated and densified based entirely on the most up-to-date high resolution aerial imagery available. After almost 12 years of data production and acquisition, around 25 million objects are now ready for the various users.

Many diverse customers on the national, the cantonal and communal level use TLM. It is used as reference data for their own data, for 3D-visualisation, for simulation or for monitoring programs. In particular, it is used by the National Solar Cadastre, the Swiss Hydrographic Network, Landscape Monitoring Switzerland LABES and the Glacier Monitoring in Switzerland GLAMOS.

TLM is now updated on a regularly six-year cycle. However, important man-made objects, such as roads on the national or cantonal level, are updated yearly. Swisstopo is working on increasing the frequency of the updating cycle for all objects.

The Netherlands

Focusing on quality management in The Netherlands

Managing data quality is one of eight goals set out in the five year strategic plan for The Netherlands Cadastre, Land Registry and Mapping Agency (Kadaster), and a key activity in 2019.

By enabling the visualisation of spatial data quality in public dashboards for Key Registers in Topography, Large Scale Topography, and Addresses and Buildings, Kadaster Netherlands not only provides data owners and users with a quality indicator, but also the opportunity to contribute to improvements through crowdsourcing. In this way it is fulfilling its ambition is to be a partner in use of geo-information.

Low data quality can have serious consequences, such as wrong tax assessments or unjustified building permits. By showing data owners how their information scores in different quality indicators, the dashboard helps quality management and assists in allocating resources to improve it.

The data owner dashboard consists of a number of quality measures and statistical data, for example the number of records they manage. It shows the data owners score on quality indicators compared to the national average, but it also shows specific errors in data.

Publicly available quality dashboards allow anyone to inspect the data quality of the register. Changes or errors can be reported via dedicated websites by clicking on the map, adding a comment and adding supporting information. Reported issues are shown on the map by a marker visible to all. A status attribute (new, under investigation, finished) is added and updated by the data owner, enabling the progress of the report to be tracked. For Key Registers Topography and Large Scale Topography, this service is available at **verbeterdekaart.nl**, for Addresses and Buildings at **bagviewer.kadaster.nl**.

Statistics about crowd-sourced reports are integrated in the quality indicator dashboards to motivate data owners to respond quickly. Kadaster Netherlands is expecting a further data quality boost for these datasets, as feedback numbers have risen significantly since introducing these websites in 2016 (Figure 1).

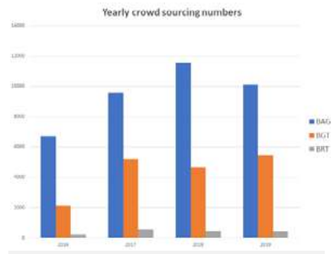


Figure 1 Crowdsourcing website and feedback numbers

Quality management is also a key part of Kadaster Netherlands' role as one of five Regional Coordinators of EuroRegionalMap (ERM), 1: 250 000 scale topographical mapping produced by EuroGeographics.

Kadaster Netherlands coordinates the annual updating of ERM in its region and merges the data into one dataset for 10 countries: Belarus, Belgium, Czech Republic, Germany, Luxemburg, Poland, Slovakia, Slovenia, Switzerland and The Netherlands. It also performs the Quality Management of ERM for all member countries.

By developing a quality management tool, Kadaster Netherlands has enabled all data producers to validate their ERM data before submitting them to the Regional Coordinators (who use the same tool for validation). This not only saves time and effort, but also improves the quality of the data. Feedback has been positive with some countries adapting the tool to validate their national topographic data.

Ukraine

Increasing transparency and availability of data with Cadastre 2.0 in Ukraine

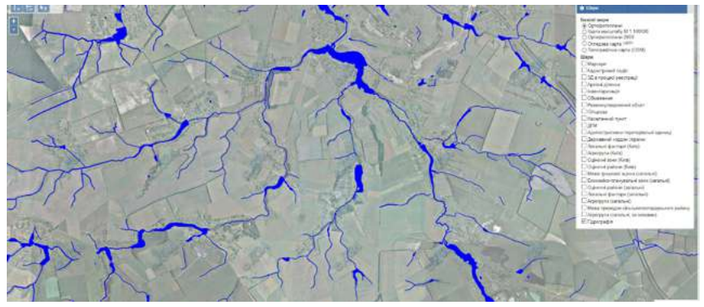
Ukraine's Cadastre 2.0 strategy is built on transparency, availability and the integration of data registries from different data holders.

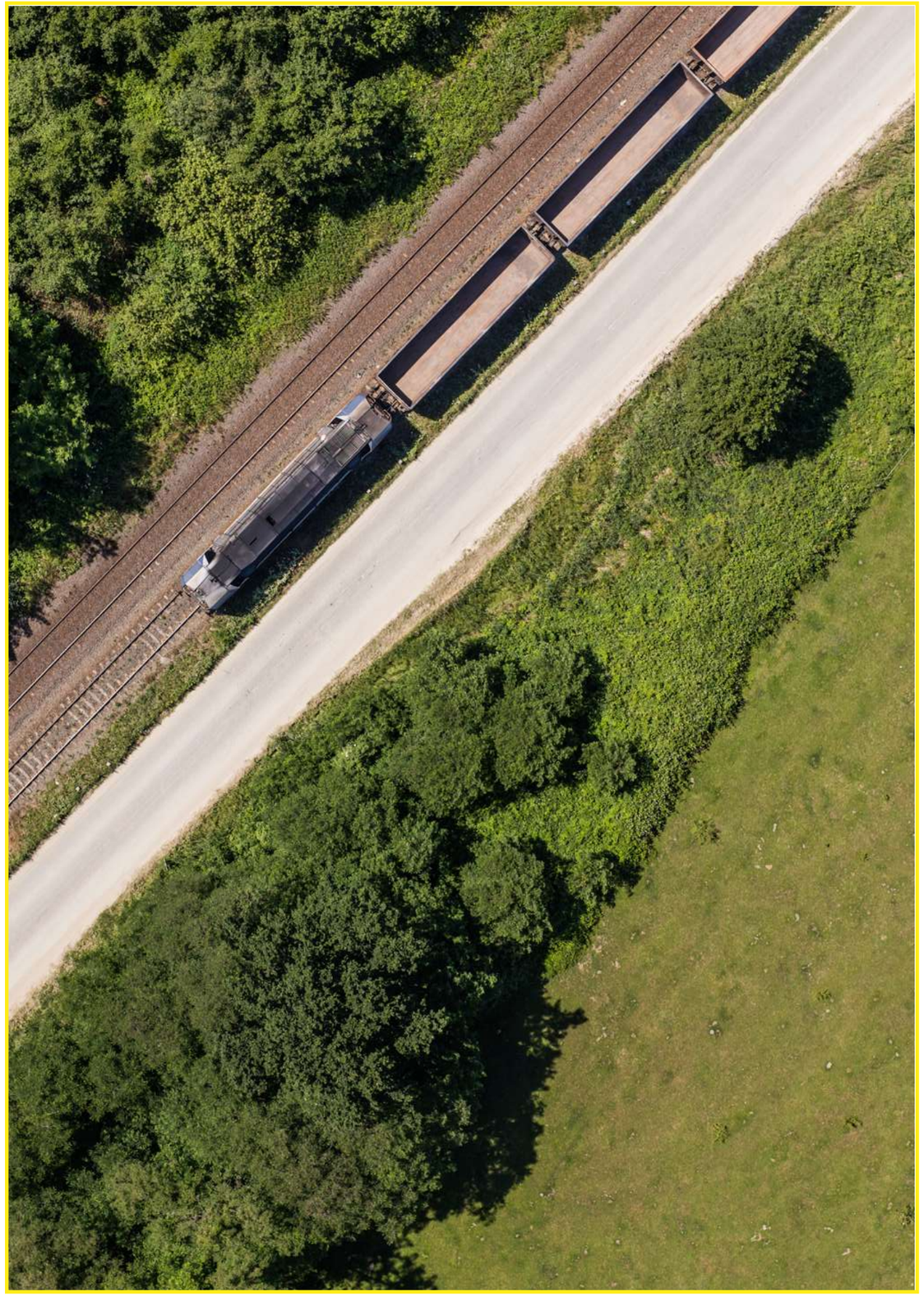
The main goals of the strategy, which will establish a national spatial data infrastructure (NSDI), were announced by Chairman of StateGeoCadastre, Mr Denys Bashlyk, and include the implementation of a number of innovations. As a result of the significant progress in cadastral development, Ukraine became the first post-soviet country to gain Observer membership of the Permanent Cadastre Committee in the EU.

Under the new policy, registries will be digitalised and integrated into one single portal that is easy for stakeholders to use. To deliver this, State Land Cadastre and the registries on water resources, subsoil, forest resources, statistics, hydrometeorology and roadmaps, signed a Memorandum of Understanding and agreed to display their data using the Public Cadastre map as a basis.

In 2019, Ukraine also joined the European levelling network/European vertical reference system 2000 of 29 countries. Following the examination of 18,300 levelling points, Ukraine proved that it complies with European standards and is committed to improving data quality.

The cooperation with the Norwegian Mapping Authority on the implementation of the International Geospatial Integrated Framework (IGIF) was also launched. In Ukraine, the IGIF plays a crucial role as the 'handbook' for creating an NSDI system with implementing IGIF components being a key task for StateGeoCadastre.





LIST OF MEMBERS

ALBANIA
State Authority for Geospatial Information

ALBANIA
State Cadastral Agency

ARMENIA
Cadastre Committee of the Republic of Armenia

AUSTRIA
Federal Office of Metrology and Surveying

AZERBAIJAN
State Committee on Property Issues of the Republic of Azerbaijan

BELARUS
State Committee on Property of the Republic of Belarus

BELGIUM
National Geographic Institute

BELGIUM
General Administration of Patrimonial Documentation

BOSNIA & HERZEGOVINA
Federal Administration for Geodetic and Real Property Affairs

BOSNIA & HERZEGOVINA REPUBLIC OF SRPSKA
Republic Authority for Geodetic and Property Affairs of Republic of Srpska

BULGARIA
Geodesy, Cartography and Cadastre Agency

CROATIA
State Geodetic Administration of the Republic of Croatia

CYPRUS
Cyprus Department of Lands and Surveys

CZECH REPUBLIC
Czech Office for Surveying, Mapping and Cadastre

DENMARK
Danish Geodata Agency

DENMARK
Agency for Data Supply and Efficiency

ESTONIA
Estonian Land Board

FINLAND
National Land Survey of Finland

FRANCE
National Institute of Geographic and Forest Information

GEORGIA
National Agency of Public Registry

GERMANY
Federal Agency for Cartography and Geodesy

GERMANY
Working Committee of the Surveying Authorities of the Laender of the Federal Republic of Germany

GREAT BRITAIN
Ordnance Survey

GREAT BRITAIN
Her Majesty's Land Registry

GREAT BRITAIN
Registers of Scotland

GREECE
Hellenic Military Geographical Service

GREECE
Hellenic Cadastre

HUNGARY
Dept. of Geodesy Remote Sensing and Land Offices, Lechner Non-Profit Ltd.

HUNGARY
Geoinformation Service of Hungarian Defence Forces

ICELAND
National Land Survey of Iceland

ICELAND
Registers Iceland

IRELAND
Ordnance Survey Ireland

ITALY
Italian Military Geographic Institute

ITALY
Revenue Agency

KOSOVO*
Kosovo Cadastral Agency

LATVIA
The State Land Service

LATVIA
Latvian Geospatial Information Agency

LITHUANIA
National Land Service under the Ministry of Agriculture

LITHUANIA
State Enterprise Centre of Registers

LUXEMBOURG
Administration of the Cadastre and Topography

MALTA
Malta Planning Authority

MALTA
Malta Land Registry

MOLDOVA
Agency for Land Relations and Cadastre of the Republic of Moldova

MONTENEGRO
Real Estate Administration of Montenegro

NORTHERN IRELAND
Land and Property Services

NORWAY
Norwegian Mapping Authority

POLAND
Head Office of Geodesy and Cartography

PORTUGAL
Directorate General for Territory

REPUBLIC OF NORTH MACEDONIA
Agency for Real Estate Cadastre

ROMANIA
National Agency for Cadastre and Land Registration of Romania

RUSSIA
Federal Service for State Registration, Cadastre and Cartography

SERBIA
Republic Geodetic Authority

SLOVAK REPUBLIC
Geodesy, Cartography and Cadastre Authority of the Slovak Republic

SLOVENIA
Surveying and Mapping Authority of the Republic of Slovenia

SPAIN
National Geographic Institute of Spain

SPAIN
General Directorate for the Cadastre

SPAIN
Territorial Commission of the Geographic High Council

SWEDEN
The Swedish Mapping, Cadastral and Land Registration Authority

SWITZERLAND
Federal Office of Topography

THE NETHERLANDS
Cadastre, Land Registry and Mapping Agency

TURKEY
General Directorate of Mapping

TURKEY
General Directorate of Land Registry and Cadastre

UKRAINE
State Service of Ukraine for Geodesy, Cartography and Cadastre

*This designation is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo declaration of independence

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Ordnance Survey Ireland

VICE PRESIDENT

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Danish Agency for Data Supply and Efficiency

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Martin Salzmann
The Netherlands' Cadastre, Land Registry and Mapping Agency (from March 2020)

Kenny Crawford
Registers of Scotland (from March 2020)

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Department of Lands and Surveys, Cyprus

Sylvain Latarget
National Institute of Geographic and Forest Information, France

Martin Lenk
Federal Agency for Cartography and Geodesy, Germany

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State Geodetic Administration, Croatia

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Rhian French
Public Relations Consultant

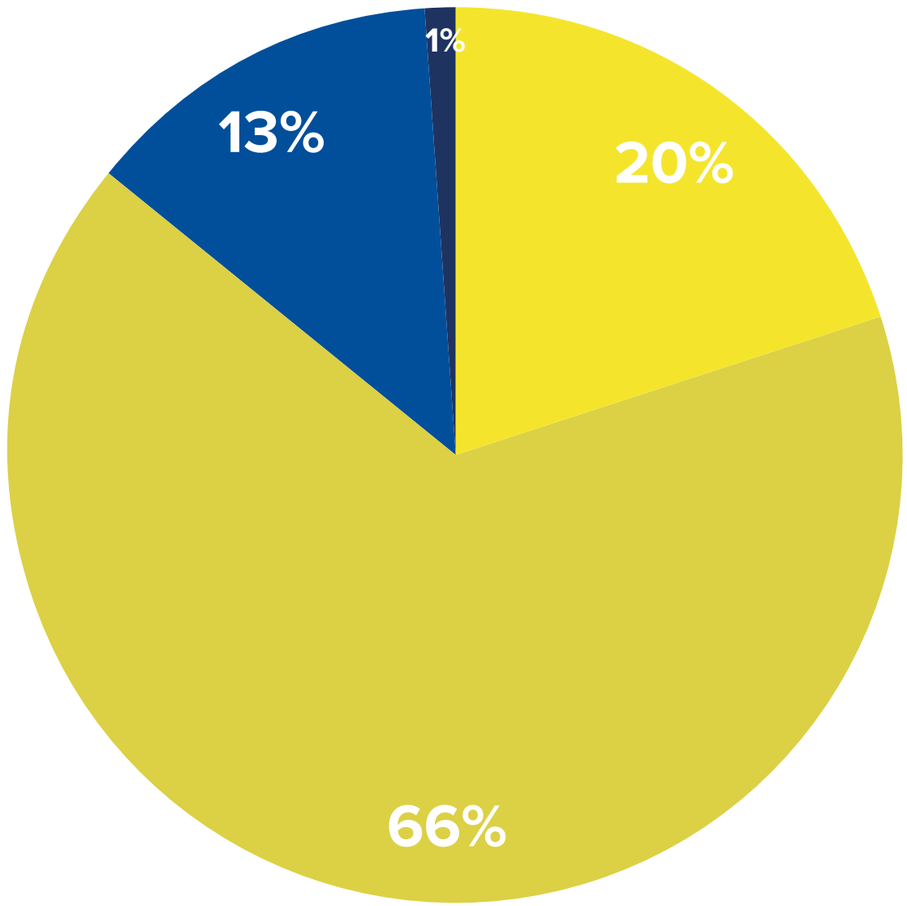
Patricia Sokacova
Membership and Communications Manager

Alina Talipova
Office Manager

Marjana Zelic
Research and Policy Officer

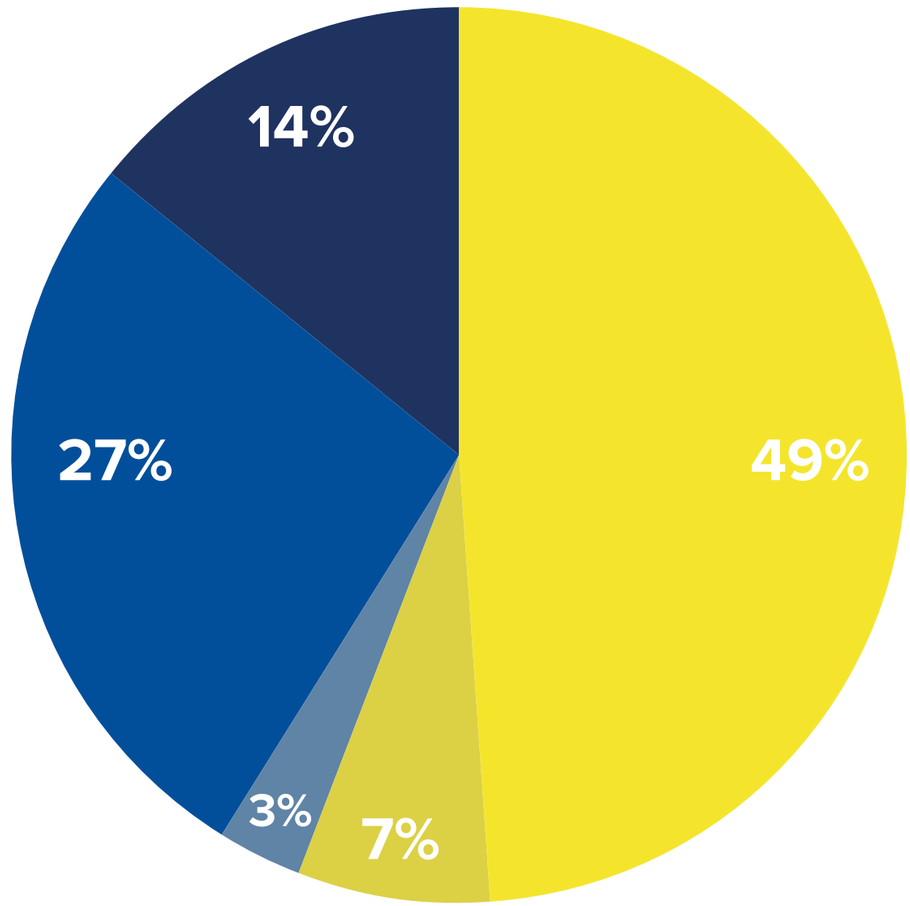
FINANCES

Income



- Sales Income
- Membership Subscriptions
- EC Grant
- Other Income

Expenditure



Total Expenditure **€1.77 million**

- Labour
- Travel
- Marketing and Coms
- Operations
- Production Costs

EuroGeographics is an international not-for-profit organisation (AISBL / IVZW) under Belgian Law. BCE registration: 833 607 112

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