Geoportal.gov.pl – main access point to the geodetic and cartographic data

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Key words: Geoportal, SDI

SUMMARY

Spatial information is a foundation for decision-making in the modern state. It describes current relationships and spatial conditions in terms of infrastructure, land, property and environmental phenomena. It allows people to take practical economic, political and social actions, and it supports efficient management and allocation of human resources. The establishment of easy and efficient access to this information is the responsibility of every democratic government.
The primary goal of building spatial information infrastructure is to make georeferenced data and related services available to citizens, businesses, and public administration. Taking this into account, The Head Office of Geodesy and Cartography (GUGiK) launched in 2008 a publicly available National Geoportal. Since then, GUGiK has constantly expanded the scope of data, functionality and network services available to users while providing the highest quality of developed solutions.
This document explains the most popular and exciting functionalities of the National Geoportal.

SUMMARY (optional summary in one other language in addition to English, e.g. your own language)

Informacja przestrzenna jest podstawą podejmowania decyzji we współczesnym państwie. Umożliwia realizację praktycznych działań gospodarczych, politycznych i społecznych oraz wspiera efektywne zarządzanie i alokację zasobów ludzkich. Zapewnienie łatwego i skutecznego dostępu do tych informacji jest obowiązkiem każdego demokratycznego rządu. Podstawowym celem budowy infrastruktury informacji przestrzennej jest udostępnienie danych georeferencyjnych i związanych z nimi usług obywatelom, przedsiębiorstwom i administracji publicznej. Mając to na uwadze, Główny Urząd Geodezji i Kartografii (GUGiK) uruchomił w 2008 roku ogólnodostępny Geoportal Krajowy. Od tego czasu GUGiK stale poszerza zakres danych, funkcjonalności i usług sieciowych dostępnych dla użytkowników, jednocześnie dążąc do zapewnienia najwyższej jakości opracowywanych rozwiązań. Dokument ten opisuje najciekawsze funkcjonalności Geoportalu Krajowego GUGiK.

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1. BASIC INFORMATION ABOUT GEOPORTAL

The main goal of the geoportal.gov.pl system, also known as Geoportal, is to provide citizens, entrepreneurs and public administration access to spatial information from official referential registers guaranteeing its quality, currency and reliability. The Geoportal is maintained and operated by the Polish national mapping and cadastral authority (NMCA) - the Head Office of Geodesy and Cartography (GUGiK).

The www.geoportal.gov.pl website is the central access point to the National Spatial Data Infrastructure (NSDI). Figure 1 shows an image of the current home page of Geoportal.

The most often used element of the website, commonly addressed as Geoportal, is the link to the main map viewer website - National Geoportal.

Figure 1 Home page of www.geoporta.gov.pl

The interface also offers the option to open other Geoportal map websites like Geoportal 3D and INSPIRE Geoportal. In addition, users can find there links to other IT systems maintained by GUGiK

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- [Centre for Spatial Analysis of Public Administration (CAPAP)](#), which contains domain-specific map applications,
- [State Geodetic and Cartographic Resource](#), which provides access to very few data sets that are yet not available as Open Data.

2. AVAILABLE DATA

The primary role of Geoportal is to provide users access to at least the most significant data sets maintained in the National Spatial Data Infrastructure. These data sets can be divided into three groups:
- data sets maintained by GUGiK
- data sets maintained by local or regional governments and integrated by GUGiK
- data sets maintained by other NSDI related organisations.

These types of data sets are addressed in more detail in the following sub-chapters.

2.1 GUGiK's data

One of the main tasks of every NMCA is to capture, maintain and disseminate spatial data. It is no different in the case of GUGiK. Following regulations of Polish geodetic and cartographic law, GUGiK is responsible for many spatial data sets, including:
- orthoimagery,
- Digital Terrain Model (DTM),
- Digital Surface Model (DSM),
- LIDAR data,
- low Scale Topographic Databases,
- State Register of Geographical Names,
- State Register of Boundaries,
- geodetic control network points.

All these data sets are published utilising a range of standardised network services. Most of these services are integrated with Geoportal's map viewer application mapy.geoportal.gov.pl allowing users to, first of all, view but also download the spatial data sets mentioned above and others. Figure 2 shows Geoportal's map viewer application presenting orthoimagery.
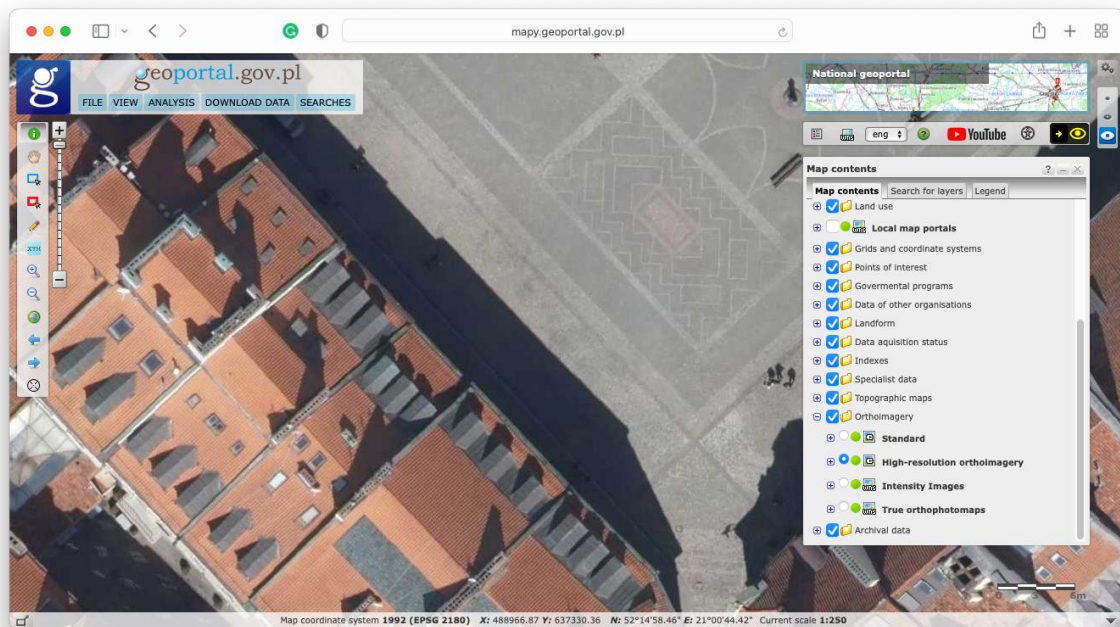
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Figure 2 Geoportal's map viewer

2.2 Data integrated by GUGiK

GUGiK integrates data maintained on a local and regional level to facilitate access to spatial information for the users. Integration improves spatial data sets usability by allowing users to view or download spatial data from the single access points for the territory of the entire Poland instead of using many local and regional access points. GUGiK developed two main mechanisms for data integration:

- database integration,
- integration of local services.

These integration methods are described in the chapters below. Services publishing integrated data sets are connected to Geoportal.

2.2.1   Database integration

A good example of database integration is a data set containing addresses, maintained in the State Register of Boundaries register. Following Polish legislation, addresses are captured and updated in Poland by 2477 communes (gminy). If the local data sets were not combined, the users interested in obtaining data for the entire Poland would have to download data from 2477 independent data sources.

However, GUGiK implemented an integration mechanism. In principle, after every data update, e.g., creating a new address point. Communes sent information regarding an address

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update to GUGiK using GML as an exchange format. GUGiK uploads new data to a single database covering the area of the entire Poland. GUGiK also disseminates all addresses captured for Poland utilising various network services, which are integrated with the Geoportal. Figure 3 shows the example of addresses data and address search results displayed in the Geoportal map viewer.
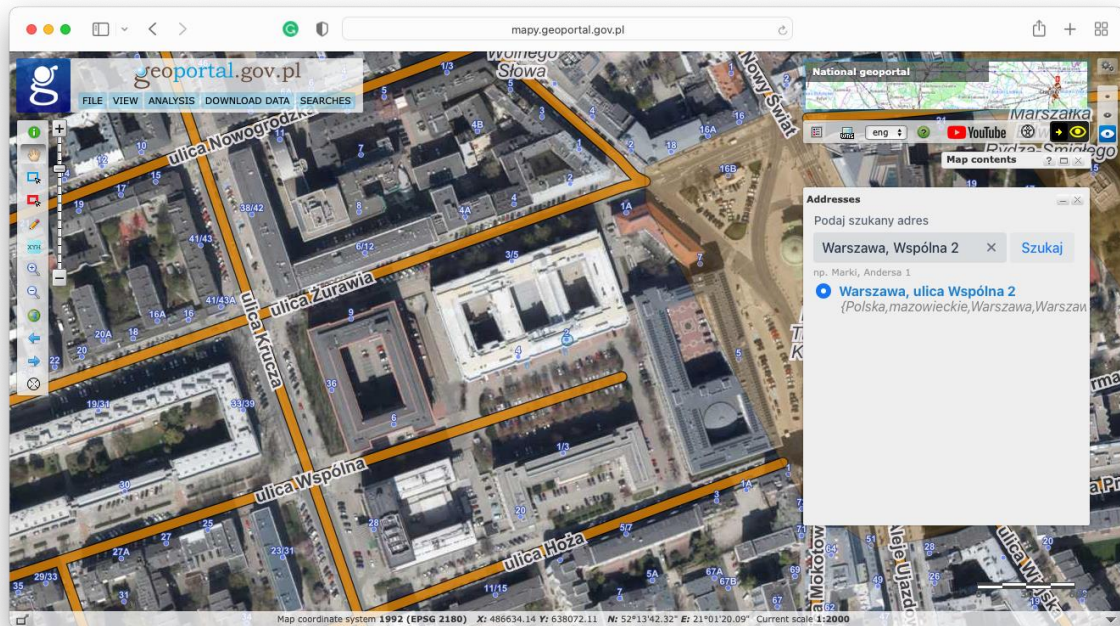

Figure 3 Addresses data presented in Geoportal

2.2.2   Integration of local services

Data sets maintained at a local level independently by different municipalities:
- have the same content, data model and structure,
- yet have different spatial extend limited by boundaries of municipalities.

A good example is cadastral data in Poland that is maintained by 380 counties (powiaty)
- counties maintain the cadastral data sets in the same national data model,
- each county maintains a cadastral data set limited spatially to the county's boundaries,
- each county is obliged by law to publish network services providing the data set the county maintains,

this results in 380 WMS independent services delivered by counties providing cadastral datasets.

GUGiK integrates independent local WMS services creating single access points providing, from the user perspective, access to one seamless data set. Currently, GUGiK publishes five such services, all of which are connected to the Geoportal's map viewer, providing:

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- cadastral data, including cadastral parcels and buildings,
- utility networks infrastructure, e.g. electricity, water, sewers, etc.,
- large scale topographic database containing, for example, the location of fences, trees, curbs, etc.,
- local development plans containing information about binding limitations of land development in specific areas,
- local land-use studies providing plans regarding land developments.

Figure 4 shows the example of cadastral, utilities and large scale topographic data displayed in the Geoportal.
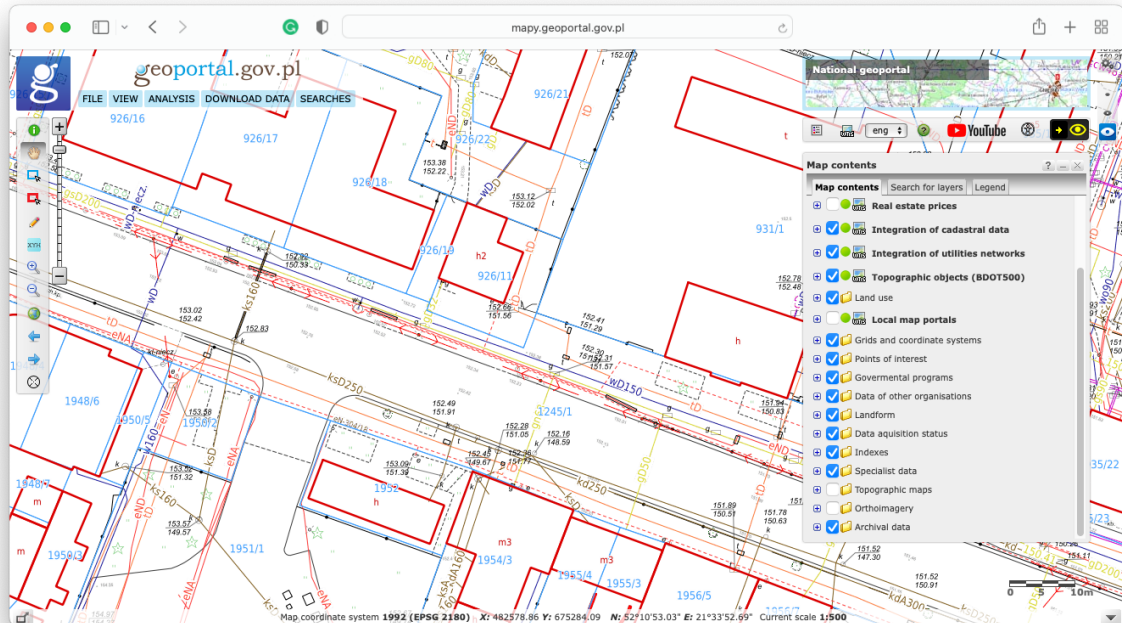

Figure 4 Cadastral, utilities and topographic data presented in Geoportal

GUGiK's approach to integrating dispersed view services is currently under the process of recognition by the European Commission (EC) as good practice and is documented in detail on EC's GitHub.

2.3 Data from other providers

Although the GUGiK is Poland's most significant spatial data provider, many other data providers also capture and deliver various spatial data sets. These data sets address user needs in domains like environment, statistics, water management, agriculture, geology, transportation, national heritage, health, etc. Services publishing these data sets are connected to Geoportal. Using Geoportal, users have access to data managed by over 20 state-level organisations, and the list is constantly growing. Among the most significant data providers, one can find:

- Institute of Meteorology and Water Management,

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- Chief Inspectorate of Environmental Protection,
- Statistics of Poland,
- Polish Geological Institute,
- General Directorate for National Roads and Motorways,
- Polish Space Agency.

Figure 5 shows an example of protected areas provided by the General Directorate of Environmental Protection.
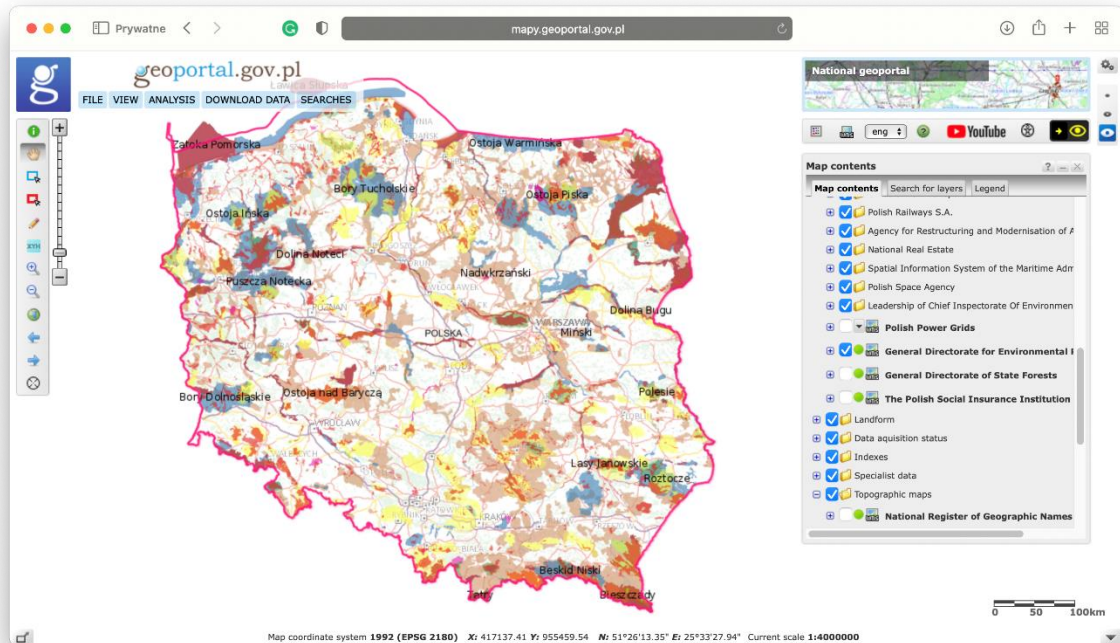

Figure 5 Orthoimagery provided by the Polish Space Agency displayed in Geoportal

3. PORTAL FUNCTIONALITIES

GUGiK's Geoportal provides its users with many analytical functionalities that significantly extend what they can find in other organisations' counterpart portals. The most important of these functionalities has been highlighted in the chapters below.

3.1 Information function

For many users, the Geoportal is an excellent source of information on "what is going on" in the Head Office of Geodesy and Cartography and Polish geodesy. It contains an updated daily news section containing information about data and services updates, events including training courses, tenders, etc.

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3.2 Data view

The most rudimentary functionality of any geoportal is the possibility to view spatial data. It is no different in the case of Polish Geoportal. Geoportal gives its users access to over 200 view services covering a wide range of spatial data. They give users powerful analytical capabilities allowing them to combine various data and thus find the answers they are looking for.

Figure 6 shows an example of a flood risk analysis by combining the GUGiKs data containing boundaries of cadastral parcels, buildings and background orthoimagery with flood risk data provided by the Water Management Authority. Using Geoportal's map viewer, a user can perform this and many other analyses for any part of Poland within less than a minute. All a user needs is a computer, Internet browser and Internet connection.
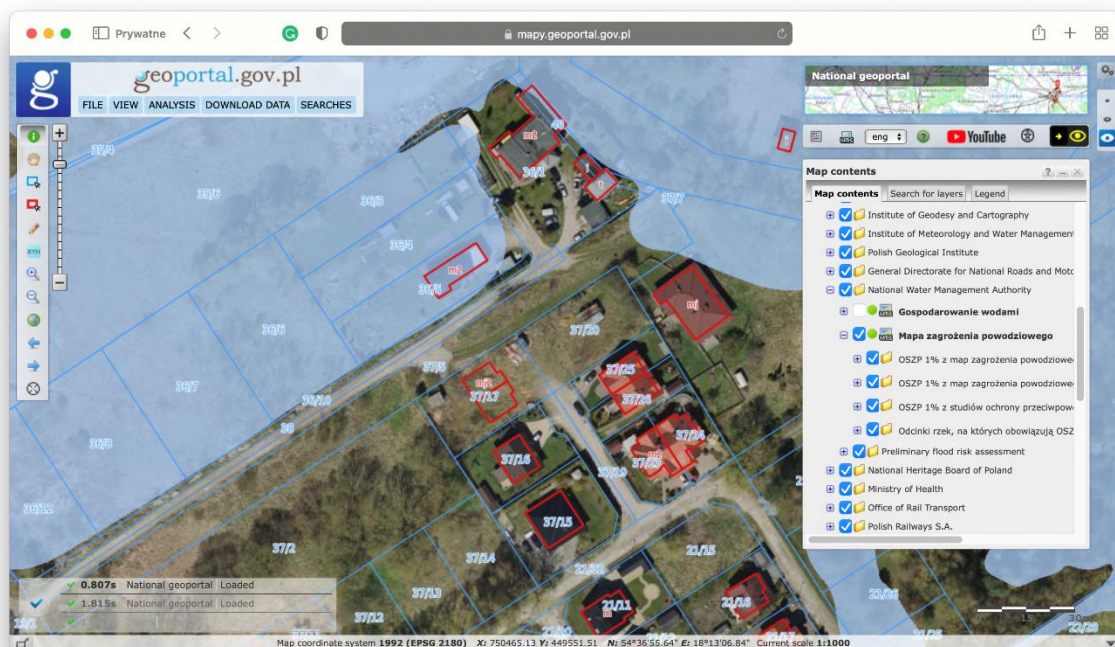

Figure 6 Example of spatial analysis - the overlap of cadastral and flood risk data

3.3 Data download

Geoportal works as a client for standardised download services Web Feature Service (WFS) and Web Coverage Service (WCS). In typical use cases, these services are considered complicated and are mainly utilised by experts. Geoportal mitigates this obstacle by providing users with a simple Graphical User Interface (GUI), allowing them to download the data they need for any part of Poland straightforwardly and intuitively. A user can choose from 20 download services that provide various vector and raster spatial data.

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Figure 7 shows an example of a high-resolution orthoimagery download for the area of Main Square in Krakow city.
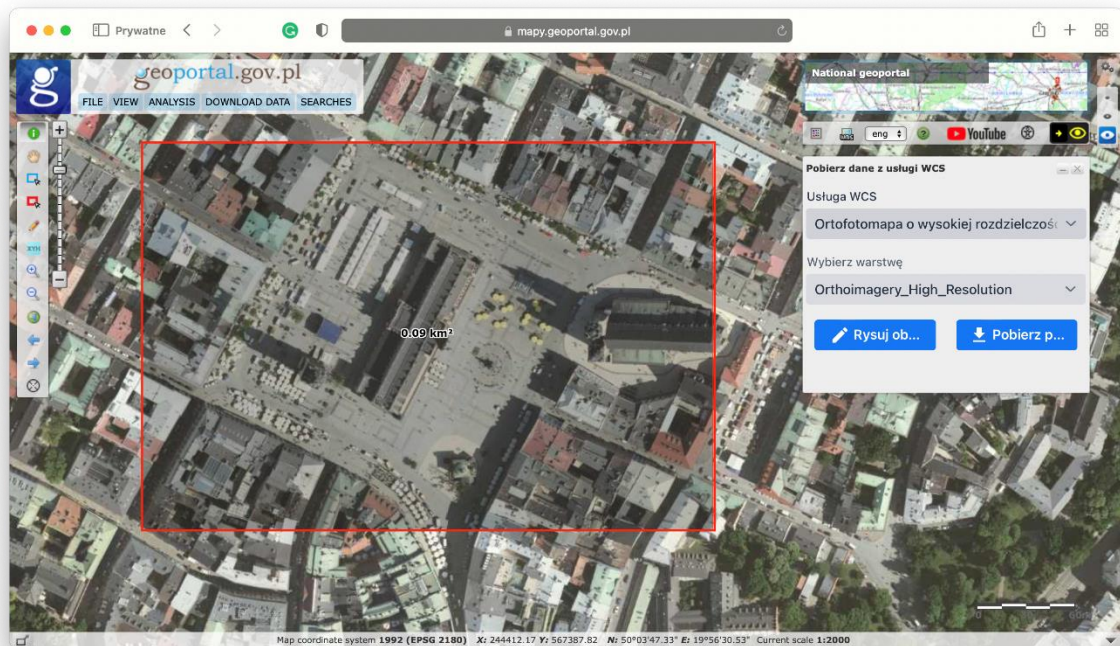

Figure 7 Example of orthoimagery download

3.4 Spatial analysis

Geoportal also offers quite a robust collection of analytical tools, like:
- simple distance and area measurements,
- DTM and DSM analysis, including terrain profile generation, landmasses volumes measurement, visibility analysis,
- Topographics data analysis,
- Car routing analysis.

All of these are available using a simple GUI.

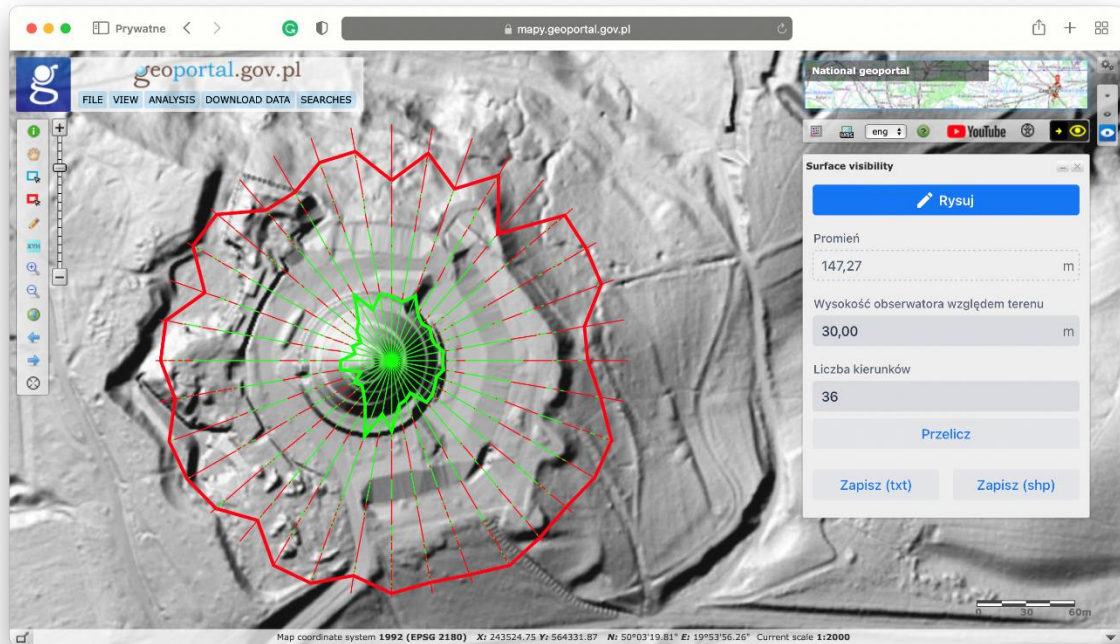Figure 8 shows an example of visibility analysis utilising DTM.

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Figure 8 Example of visibility analysis

Figure 9 shows an example of topographic database analysis. This analysis checks how many buildings higher than 20 floors are located in mazowieckie voivodship (region).
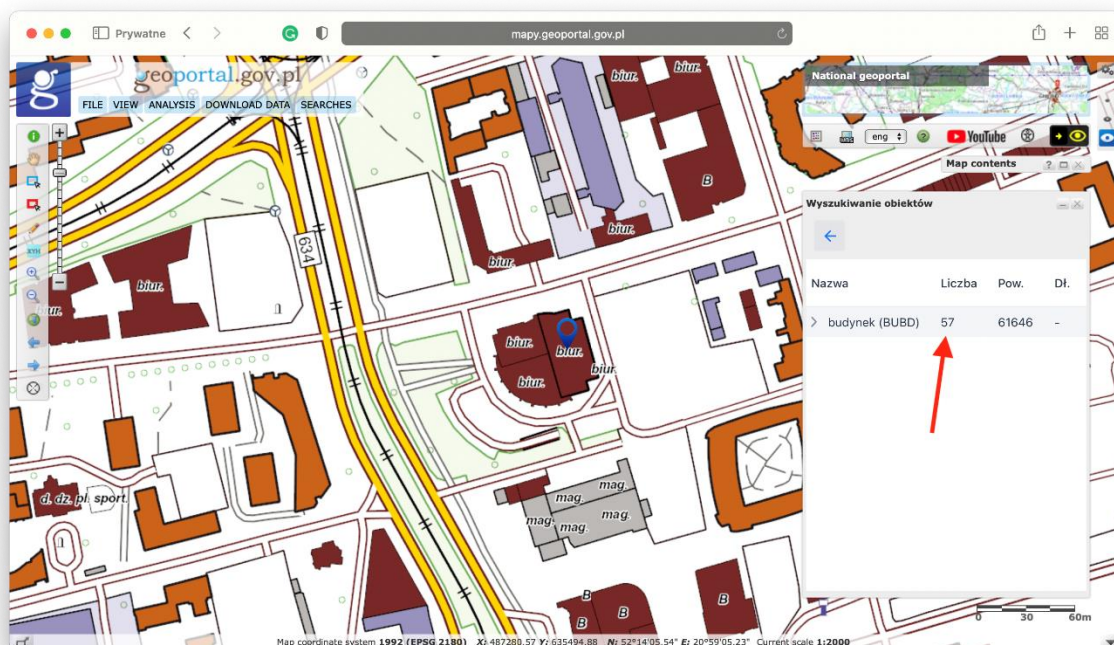
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Figure 9 Example of analysis based on topographic data (BDOT10k)

4. RELATION TO OTHER IT SYSTEMS

Any IT system can significantly improve its functionality by allowing integration with other IT systems, thus creating a synergy effect. It is no different in the case of Polish Geoportal. Geoportal provides a simple API supporting integration with external systems. Examples of synergies achieved between Geoportal and other state and commercial systems are presented in the following subchapters.

4.1 Land register

The Land Register System (Księgi Wieczyste) is maintained by the Ministry of Justice and stores legal data about real estates located in Poland. Its primary role is to facilitate and support real estate trade in Poland by allowing to unambiguously find out who has rights to a particular real estate and what kind of rights. However, the Land Register focuses on legal and not spatial aspects of real estate. Therefore, the land register has been joined with the cadaster register by utilising Geoportal API functionality. Joining mechanism works by changing identifiers of the cadastral parcel being a part of a real estate to hyperlinks pointing to the corresponding cadastral parcels on Geoportal. As a result, after verifying legal characteristics, users can, with only one mouse click, switch to Geoportal and analyse spatial elements of real estate, including its location, shape, availability of utilities, etc.

Figure 10 shows an example of a real-estate entry in the Land Register with a hyperlink to Geoportal.

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Figure 10 Linking of Land Register with Cadaster Register

4.2 eRolnik

eRolnik is an IT system maintained by the National Centre of Agriculture Support and designed to help farmers in their activities. For example, eRolnik allows farmers to check the list of agriculture parcels offered for sale. Similar to the case of Lan Register, eRolnik allows jumping with one mouse click from the offer to the location of the parcel presented in the Geoportal's map viewer.

4.3 Commercial systems

The use of Geoportal is not restricted to public administration only. On the contrary, private sector entities have the same access rights as public organisations. As a result, many commercial IT systems integrate with Geoportal or other services provided by GUGiK.

One example of such integration is the portal adresowo.pl, which mainly focuses on publishing advertisements for real estate sale offers. When adding a sale offer to adresowo.pl, the portal user can also provide a link leading to the location of the offered parcel on Geoportal. An example of such an advertisement is presented in Figure 11.

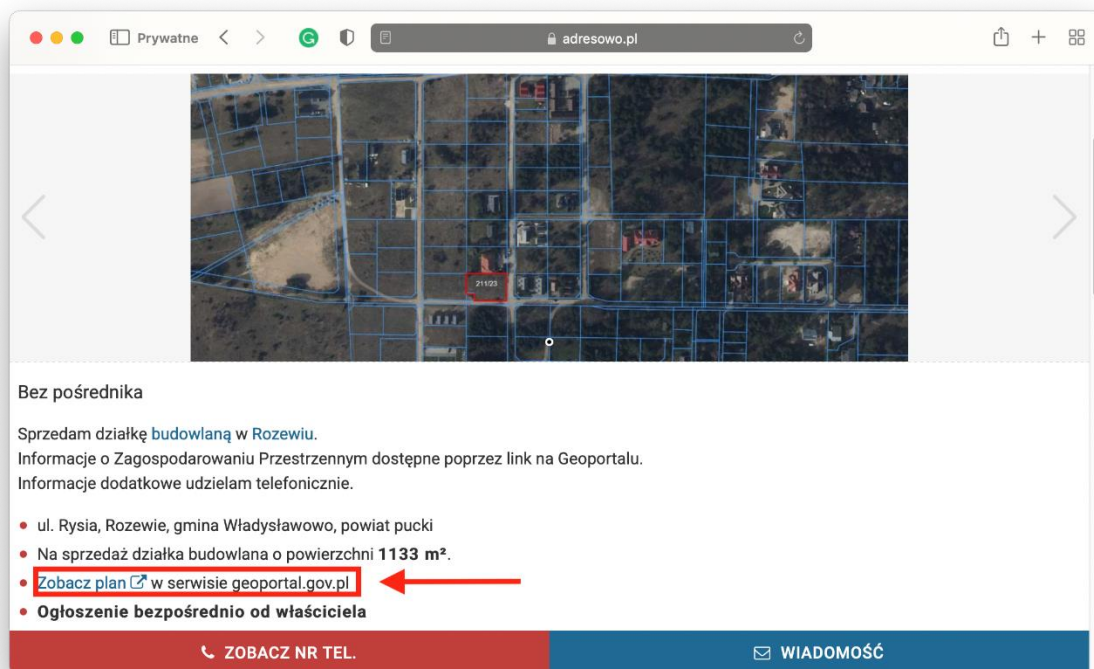Geoportal.gov.pl – main access point to the geodetic and cartographic data (11577)
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Figure 11 Linikig of commercial system adresowo.pl with Geoportal

5. PORTAL UTILISATION

With 800 000 unique users of the map application, only Geoportal can be considered a very successful GUGiK's achievement. Currently, Geoportal is third the most popular portal maintained by the Polish public sector organisation.

Figure 12 shows statistics of unique monthly users entering Geoportal's map viewer application.

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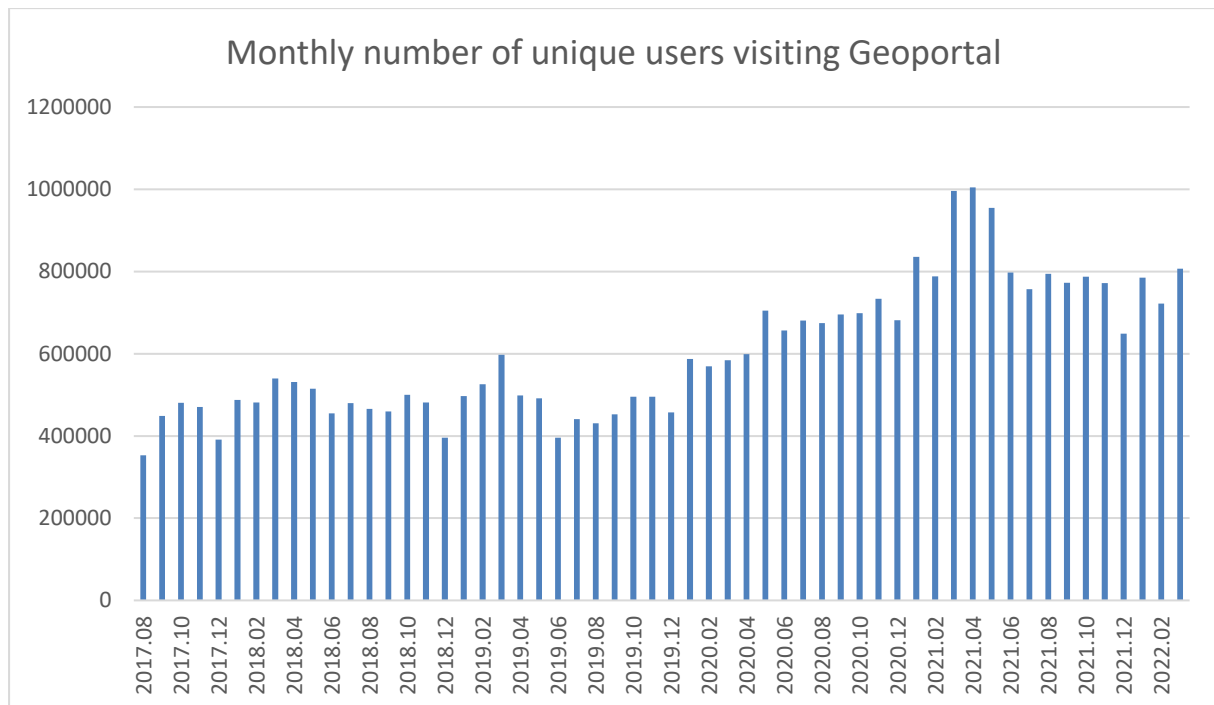Warsaw, Poland, 11–15 September 2022

Figure 12 Geoportal's map viewer user statistics

GUGiK organises a series of capacity building activities about Geoportal and SDI. These activities show practical examples of utilisation of Geoportal in everyday work.
From 2019 to March 2022, GUGiK, during 66 courses, trained 3199 people representing public sector organisations.

In addition, GUGiK organised dedicated Geoportal tailor-made training sessions for specialists from specific domains, including:
- 903 representatives of Polish geodetic and cartographic service,
- 951 real estate agents,
- 97 entrepreneurs,
- 2963 representatives of communes (local governments).

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BIOGRAPHICAL NOTES

Waldemar Izdebski is a professor at the Faculty of Geodesy and Cartography of the Warsaw University of Technology. He is also the founder of the company Geo-System Sp. z o.o., where he served as the President of the Management Board until 7 June 2018. Since the early 1990s, both in his academic work and commercial activities, he has been actively contributing to the implementation of technical advancement in Polish geodesy. His work has appeared in many publications. He has participated in the work of expert groups, and numerous implementations of software developed directly by him or under his direction.
Since 7 June 2018, while still employed at the Warsaw University of Technology, Waldemar Izdebski has also held the position of the Surveyor General of Poland and the Chairman of the Council for Spatial Information Infrastructure.

Marcin Grudzień is a SDI expert. He has taken an active part in building Polish Geoportal - the third-biggest public sector IT system in Poland, addressing its stakeholders' technical, semantic, operational, and legal aspects. Marcin has extensive experience in all tasks related to complex IT system development process: from the initial phase - analysis of cross-sector user requirements, standards and available data sets, identification of requirements including data analysis, through development and implementation including supervising of contractors and quality control of deliverables, up to daily administration and maintenance of a big IT GIS system.
Currently works in GUGiK as Deputy Director of the Strategy and International Cooperation Department. He is also the Chair of EuroGeographics' INSPIRE Knowledge Exchange Network and a member of INSPIRE Maintenance and Interoperability Technical Group (MIG-T).

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