

# CENAGIS Geo-Cyberinfrastructure as a R&D Environment for a Surveyor 4.0

Dariusz Gotlib, Kamil Choromański and Bogusław Kaczalek (Poland)

**Key words:** Geoinformation/GI; GSDI; AI cyberinfrastructure; geo-cloud computing; geospatial analysis

## SUMMARY

In the middle of the 4th industrial revolution, surveyors effectively need to use new geo-information tools. There is a need for IT cloud-based test environments to support R&D work. The answer to such demands is the cyberinfrastructure CENAGIS originally designed and developed in Warsaw University of Technology, built within the Center for Geospatial and Satellite Analysis.

It is prepared as "a sandbox" for training work on virtual computers and using many developing technologies, such as containerization, distributed and parallel computing, GPU computing, Artificial Intelligence (AI), and big data models. In one place, users have access to rich geospatial data resources from Polish SDIs (from cadastral, through topographic, geological, statistical, to weather, and environmental data). Available data includes point clouds from laser scanning for the entire Polish territory and satellite images from the European Space Agency. Users can also upload, compare, correct, and process their own measurement data. In cooperation with other entities, extending the Repository's content with data from different countries and regions is possible.

Users can use the available software packages with configured access to the data in the Repository. There is also a Geospatial Analysis Platform available to share self-developed analytical services and take advantage of solutions shared by others. There are also groupware tools that allow collaboration between users, especially between researchers and company specialists.

The paper will present the architecture and technological solutions used as well as the proposed work model. The solution is based mainly on open source technologies such as CloudStack, Apache Spark, Hadoop, Jupyter Hub. There are use relational databases and NoSQL. The user can use the infrastructure in the IaaS (Infrastructure as a Service), PaaS (Platform as a Service), and SaaS (Software as a Service)

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models.

The paper will show selected use cases related to the work of Surveyor 4.0. The research results on infrastructure performance and plans for further development will also be presented.

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