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Geospatial Data Management Platform for Urban Groundwater

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Due to the large amount of civil work projects and research studies, large quantities of geo-data are produced for the urban environments. These data are usually redundant as well as they are spread in different institutions or private companies. Time consuming operations like data processing and information harmonisation represents the main reason to systematically avoid the re-use of data. The urban groundwater data shows the same complex situation. The underground structures (subway lines, deep foundations, underground parkings, and others), the urban facility networks (sewer systems, water supply networks, heating conduits, etc), the drainage systems, the surface water works and many others modify continuously. As consequence, their influence on groundwater changes systematically. However, these activities provide a large quantity of data, aquifers modelling and then behaviour prediction can be done using monitored quantitative and qualitative parameters.

Due to the rapid evolution of technology in the past few years, transferring large amounts of information through internet has now become a feasible solution for sharing geoscience data. Furthermore, standard platform-independent means to do this have been developed (specific mark-up languages like: GML, GeoSciML, WaterML, GWML, CityML). They allow easily large geospatial databases updating and sharing through internet, even between different companies or between research centres that do not necessarily use the same database structures.

For Bucharest City (Romania) an integrated platform for groundwater geospatial data management is developed under the framework of a national research project - “Sedimentary media modeling platform for groundwater management in urban areas" (SIMPA) financed by the National Authority for Scientific Research of Romania. The platform architecture is based on three components: a geospatial database, a desktop application (a complex set of hydrogeological and geological analysis tools) and a front-end geoportal service.

The SIMPA platform makes use of mark-up transfer standards to provide a user-friendly application that can be accessed through internet to query, analyse, and visualise geospatial data related to urban groundwater. The platform holds the information within the local groundwater geospatial databases and the user is able to access this data through a geoportal service. The database architecture allows storing accurate and very detailed geological, hydrogeological, and infrastructure information that can be straightforwardly generalized and further upscaled.

The geoportal service offers the possibility of querying a dataset from the spatial database. The query is coded in a standard mark-up language, and sent to the server through a standard Hyper Text Transfer Protocol (http) to be processed by the local application. After the validation of the query, the results are sent back to the user to be displayed by the geoportal application.

The main advantage of the SIMPA platform is that it offers to the user the possibility to make a primary multi-criteria query, which results in a smaller set of data to be analysed afterwards. This improves both the transfer process parameters and the user’s means of creating the desired query.