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An approach in groundwater data migration and integration

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The conceptualization of a groundwater system involves continuous monitoring and evaluation of a large number of parameters (e.g., groundwater levels, temperature, pH, or hydraulic parameters). All these datasets collected and generated to perform a groundwater conceptual model are often stored in different scales and formats (e.g., maps, spreadsheets or databases) from different entities. This continuous growing volume of data entails further improving on how it is stored.

One of the pillars of effective data governance is data management. Data management is successful when data are: harmonised collected, structured stored, error checked, available, understandable and reusable ensuring maintenance of the data model. There are several developments to stewardship information and they can be implemented in industry, government and academia reducing times and resources to perform environmental analyses. These kinds of data infrastructures, data warehouses and/or Spatial Data Infrastructures (SDI) and their governance are becoming more mature worldwide because of their importance in ensuring sustainable resources. Data infrastructures, such as data warehouses and SDI, and their governance are continuously being used and developed because of their impact on groundwater management. In addition, these kinds of data infrastructures currently require information communication technology (ICT) tools for improving geodata governance by delivering quality information to users and helping them perform further analyses on a unique platform. To implement these data infrastructures or to connect it to ICT tools is essential an optimal data migration and integration (DMI). DMI also is useful for decision-making with clean high-quality data, which produces a more confident and stringent groundwater governance. To ensure an optimal DMI, it is valuable to provide frameworks with which to assist and facilitate processes to connect and transform multiple systems from different sources and formats to the required destination formats of new systems. Facilitation of how the connections among system structures and the organization of a DMI model in terms of its application and maintenance should be as intuitive as possible.

We present a methodology to facilitate and optimise DMI to improve data governance. The implementation of this DMI methodology facilitates merging multiple sources of information, installing new systems to exploit stored information while using the original systems of information storage, and upgrading databases, formats or standards that may not be supported in the future to one that is supported or most appropriate, among other processes. The outcomes of its application by the Barcelona City Council (Spain) are used to optimise the groundwater management in the city. DMI models performed in this application can be easily adapted to other external datasets, increasing the volume of quality data to improve the understanding of the groundwater system behaviour and the monitoring network in the city. The proposed methodology can be widely implemented in any kind of DMI project to develop data infrastructures or to implement ICT tools for further analyses.

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