

3D Geo-database Services

Interdisciplinary solutions for early hazard warning and disaster management require easy access to large sets of geo-referenced data. Therefore, three-dimensional (3D) geo-databases, hitherto hardly noticed by the public and decision makers, will probably have a central role to play, a situation comparable to the appearance of 3D city models 15 years ago. At that time, these models seemed to be too expensive to become widely used, but now it is clear that visualisation of 3D city models is only the first step on the way to further analysis for experts and decision makers in disaster management.

Obviously, the processing and integration of interdisciplinary geo-referenced 3D data sets describing human and physical phenomena are necessary to provide experts with relevant information for risk assessment in early warning and disaster management scenarios. For example, meteorological, geological and city models intrinsically describe 3D phenomena and structures. These cannot be modelled in 2D space only.

Unfortunately, no ready-to-use 3D geo-database services with sophisticated 3D database operations are already on the market. However, the 'gap' between theoretical approaches or prototype systems on the one side and application-driven 3D approaches on the other has been significantly reduced during the last few years. Good news for the user of 3D geo-database services is that their service-based architecture will provide easy-to-use internet-based access.

Therefore, following a toolbox approach, the user will work only with a limited set of 3D geo-database services, rather than searching the suitable functionality between thousands of operators in a 'historically grown GIS'. 3D geo-database services containing 3D spatial operators such as distance, volume or intersection operators between 3D geo-objects will be very attractive for hazard analysis and disaster management. They will be able to compute the volume of moving rocks to be expected during a landslide, for example.

Embedded into web-based infrastructures, 3D geo-database services will provide an easy-to-use interface with one HTML call per service execution. Undoubtedly, a new generation of standardised 3D web processing services will have the potential to create new chances for early warning and disaster management. Besides 3D services, this vision is pursued in '4D' geo-database services, supporting the analysis of spatio-temporal phenomena such as the simulation of mass movements or the temporal visualisation of disaster management scenarios.