Candidate 3D Standards

The Open Geospatial Consortium (OGC) has published three new candidate standards which are related to the 3D GeoWeb as public discussion papers (DP) on its website. These are a revised version of the Web 3D Service (W3DS) and the Web View Service (WVS). An extension profile of the Symbology Encoding Specification for 3D (SE 3D) has been added that can be used with the both services.

These establish a new family of 3D portrayal services focusing on virtual 3D maps, interactive virtual environments, and 3D cartographic visualisation.

Web 3D Service (W3DS)
The purpose of the W3DS is to support interactive 3D web applications such as virtual fly-throughs, virtual globes, and information systems on the web showing landscape and city models. The features of the formats being used enable to add more realism to sceneries by applying textures, complex materials, animations, levels-of-detail (LODs), lights, sounds, or other visual effects. The content can be integrated into existing applications or it can be combined with local data allowing realizing real GIS analysis and complex workflows with high interactivity. Data from several servers can be integrated into one complex scene. For example, a planned building from your local hard drive may be placed in a scene provided by a W3DS which is maintained by the municipality.
The W3DS can be used in two ways. One way is to generate a complete 3D map with all the geospatial content that is required by a specific application and a spatial extent that can be freely defined. This map can be shown and explored in a browser or other off-the-shelf viewer software and easily linked with web portals since the map can be defined by a single hyperlink. Additional predefined viewpoints and navigation modes may be used to guide the user. The second way is to use the W3DS as a streaming server and download all geospatial content tile-by-tile and layer-by-layer. It could be already shown that huge data sets covering whole states with millions of buildings can be visualised (www.osm-3D.org, www.NRW-3D.de) using the experimental XNavigator client, which implements a block based streaming schema.
The W3DS, now available in version 0.4, is built around 3D web formats that are widely adopted by the industry, especially X3D, KML/KMZ and Collada. Unlike GML, these formats focus on the visual appearance and performance of 3D models, exploiting the capabilities of modern graphics hardware. Also the size and memory footprint is generally smaller compared to GML, which makes them suitable for the distribution in limited bandwidth networks.
Other features of the W3DS include explicit support of multiple LODs, server styles (for instance a layer may be available as default style, showing all object in their original appearance, and alternative style which modifies all colors based on available attribute data), and a temporal component (access to historic models).
A reference implementation is being developed at the University of Heidelberg, GIScience Research Group, headed by Prof. Alexander Zipf. http://www.geog.uni-heidelberg.de/giscience.html
It is already used in several online services such as www.OSM-3D.org or www.Heidelberg-3D.de. The latter is also used within the administration of the municipality and is linked to the 2D system with an synchronized automated update of new building models.

Web View Service (WVS)

The Web View Service (WVS) is an interactive image-based 3D portrayal service that provides a different approach of how to visualize 3D city and landscape models based on server-side rendering. The WVS encapsulates the whole portrayal process at server side and delivers multi-layer rendered images of 3D scenes to the service consumer. The WVS extends the Web Terrain Service (WTS) and the OGC-internal Web Perspective View Service (WPVS); in a way, the WVS can be considered as the 3D counterpart for the well-established Web Map Service (WMS).
The WVS is designed to overcome the restricted visualization and interaction capabilities of WTS/WPVS-based approaches. As a major extension, the WVS provides additional geometrical and thematic data, such as depth information and object identity information, which are encoded in the retrieved multi-layer images. Additionally, the WVS provides operations for retrieving information on visualized objects at specific image positions, measurement functionalities, and enhanced navigation support. Further extensions target at minimizing communication overhead and minimizing bandwidth usage.
Regardless of a client's 3D rendering hardware and software, the WVS can provide high-quality images of 3D geodata since the rendering is performed by a dedicated 3D server system. The image-based approach simplifies the service-based integration of high-quality images of 3D views on 3D geodata into almost any application and system related to 3D geodata. Due to the server-side data management and rendering, the WVS can be used by resource-limited thin clients and under low bandwidth conditions - the steady transmission of data to clients does not depend on the complexity of the 3D model data. Based on the WVS capabilities, even complex, rich feature 3D clients, supporting, e.g., continuous real-time navigation and interaction in the 3D world, can be built.
At the Hasso Plattner Institute (HPI) at the University of Potsdam, a WVS reference implementation is currently being developed by the Computer Graphics Systems group headed by Prof. Jürgen Döllner.

3D Symbology Encoding (3D SE)
Already in the previous OGC TC Meeting an extension of the well-known Symbology Encoding (originally developed as Styled Layer Descriptor, SLD fort he WMS specification) has been published as a public dicussion draft. The extension realizes a 3D profile of the Symbology Encoding. This profile can be used in combination of the both ervices mentioned above. For the W3DS there exists already a

first implementation within the project GDI-3D.de.

3D SE is compatible with the conventional Symbology Encoding offering all options for visualizing 2D geometries, text and also themtical, geometric and topologicals selections based on the OGC Filter Encoding. In addition to the styles offered by the service directly (Server Styles) it is also possible for the user (or client) to specify a style on the fly (User Styles). This allows to integrate 3d scenes from different W3DS services and visualize those in an uniform way. Also thematic classifications can be realized. Additional extensions of 3D SE deal with the placement, transformation and rotation of objects in all three axes, symbolizer for analytical styling of DEMs, integration of external 3D objects in the scene or the definition of complex materials and other options.

Der 3D SE discussion draft has also been developed at the Chair of Geoinformatics, Prof. Zipf, University of Heidelberg and is already being used in a productive environment at the city administration of the city of Heidelberg (heidelberg-3d.de).

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https://www.gim-international.com/content/news/candidate-3d-standards

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