

Integrating 3D, Processing and Location Services into future SDIs

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Until recently development of SDIs seen from the technical point of view focused on 2D geographic data and its management and visualization (mapping) mostly. Recently a range of new specifications by the OGC offer a much broader range of possible services including 3D, routing, geoprocessing and more. Therefore much more sophisticated applications based on future SDIs using open standards can be realized. Within projects like Heidelberg-3D (Geo-Spatial Data Infrastructure 3D <http://www.gdi-3d.de>) or www.Ok-GIS.de (Open and Free GIS for Disaster Management) we set up a 3D-SDI based on relevant services (WFS, WMS, CS-W, WCS, WPS) using Open Source tools and frameworks such as geoserver and deegree. These are supplemented by our own implementations of:

- OGC Web3D Service (W3DS) – serving 3D scenes, accompanied with our 3D-Viewer
- OGC OpenLS Route Service (RS)
- OGC OpenLS Utility Service (Geocoder/Reverse Geocoder)
- OGC OpenLS Presentation Service

The OpenLS directory service will be added later. Based on these base services we have realized further services that use these OWS:

- 3D Route Service (3DRS)
- Emergency Route Service (ERS)
- 3D Emergency Route Service (ERS-3D)

All of these use the OpenLS RS interface, but provide extended internal functionality.

The new OGC Web Processing Service (WPS) specification now also allows to process geodata in a quite generic way within SDIs. This has caused a lot of discussion and needs further research. We have realized a range of new WPS processes using the current implementation of the deegree WPS and analysed some pros and cons of using the current version of the specification for geoprocessing in SDIs.

Additionally we realized a new "Accessibility Analysis Service" (AAS) for calculating accessibility to given locations. The interface is related to the OpenLS interfaces, but could also be integrated into a WPS.

The current state of these new services for SDIs will be introduced and their service interaction within the SDI will be illustrated through applications as 3D-navigation or disaster management. Within these project a range of additional aspects have been investigated that are relevant for realizing future. The main results of these can be highlighted and include:

- What about metadata for 3D landscape and city models? Are standards as ISO 19115 sufficient or what amendments would be wishful?
- Experiences from chaining OWS through Web Service Orchestration based on BPEL (Business process Execution Language)
- Preprocessing of 2D and 3D data using the Web Processing Service (WPS) e.g. generalization of the DEM, aggregating data etc.
- 3D-SLD: Extending the 2D-GIS concept of separation of raw geometry data and visualization rules (Styled Layer Descriptor SLD or the new Symbol Encoding, SE) into 3D. For that we developed an XML-schema as a proposal for a 3D-profile for SLD/SE. It is currently implemented into our W3DS. First results can be presented.
- Our current and future work on integrating OGC Web Services, SDIs and the concept of GRID-Computing (www.gdi-grid.de)

(~480 words)

