

25 August 2002

Original: English

Eighth United Nations Conference on the
Standardization of Geographical Names
Berlin, 27 August-5 September 2002
Item 12 (e) of the provisional agenda*

TOPONYMIC DATA FILES: COMPATIBILITY AND STRUCTURE OF
SYSTEMS

Interoperable Gazetteer Services
(Submitted by Germany)**

*E/CONF.94/1

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Abstract: The evolution of gazetteers from appendices of printed atlases to well-known place-name vocabulary stored in digital databases led to a separation of the data storage and user interface components. When crossing the borders of place-name authorities, data interchange is needed and can be achieved by two alternative strategies – the "collection" and the "services" approach. Standardised and interoperable gazetteer services are the main building block for the development of a digital gazetteer network. The Open GIS Consortium's approach of a "Web Gazetteer Service" conforms to the ISO Draft International Standard 19112 "Geographic information - Spatial referencing by geographic identifiers" and establishes a basis for designing interoperable gazetteer services.

INTEROPERABLE GAZETTEER SERVICES

Printed versions of gazetteers, e.g. in a national Atlas, combine the database of place-names with an easy-to-use user interface: Place-names are listed in alphabetical order together with their location on earth (latitude/longitude) or their location on a map in the atlas (page, grid cell). With digital gazetteers these two aspects are separated: A gazetteer *database* is accessed by the operations provided by an interface or *service*.

The issue of gazetteer service interoperability arises when information interchange is needed. Considering the fact that well-known place-name vocabularies are maintained distributedly by local, regional, national, or international bodies, the simple search for populated places called "Salzburg" in Europe – of which exist at least one in Austria and three in Germany – becomes a nearly unresolvable problem. A comprehensive European database of place-names queryable via the Internet might be the first choice to succeed. Unfortunately such a tool does not exist so far.

A potential realisation of an Internet-accessible European gazetteer has to choose between two alternative implementation strategies. Either gazetteer data of all national bodies in Europe is collected and harmonized (which might presume that national bodies have to collect and harmonize gazetteer data of sub-ordered bodies), or gazetteer services of national bodies are tied together in a virtual European gazetteer service (which might include that national gazetteer services have to behave as virtual gazetteer services, too). The "collection" approach produces a huge amount of redundant data with the inherent problem of tracking the updates of the underlying data sets. The "services" approach simply establishes connections between different data bases.

The Open GIS Consortium (OGC) is currently developing a specification of a Web Gazetteer Service which can be used to build up such a distributed gazetteer network. The OGC is an international industry consortium which aims at the development of geoprocessing standards which support the seamless integration of geoprocessing facilities into mainstream information technology (see <http://www.opengis.org/> for further information). A Web Gazetteer Service is considered as a specialised geospatial data server supporting a powerful query language and an application schema which conforms to the ISO standard for "Spatial referencing by geographic identifiers" (ISO DIS 19112, see <http://www.isotc211.org/> for further information).

The standardised application schema forms the basis of semantic interoperability, whereas the query language adds syntactical interoperability, allowing for searches on all attributes of the location instances (gazetteer entries), including identifier, category, and position.

The crucial issue of this approach is the question if the gazetteer application schema, as defined by ISO, meets the needs of the digital gazetteer databases that already exist. In a German regional (Northrhine Westphalian) geospatial data infrastructure initiative the development of a gazetteer service accessing data from different heterogeneous sources addresses this issue. The implementation is based on the OGC Web Feature Server of the deegree project, a free software (open source) project for geospatial solutions (see <http://www.deegree.org/>).

The database for this prototype is built up using the following data sets:

Data set	Institution / Owner	Scale
Geographic Names Database (Germany subset)	US: National Imagery and Mapping Agency (http://www.nima.mil/gns/html/)	global
Geographical Names & Administrative Units	Germany: Federal Agency for Cartography and Geodesy (http://www.bkg.bund.de/index_english.htm)	regional/national
Geocoder Address data (Northrhine Westphalian subset)	Germany: infas GEOdaten (http://www.infas-geodaten.de/)	local

The data sets of the first two institutions are integrated in a spatial database with the original data model being maintained. The mapping to the ISO schema is realised by on-the-fly transformations using XSLT. The address data set is attached to the gazetteer service by using a wrapper to online access the owner's proprietary Geocoder service protocol.

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