Environmental Data Infrastructures

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Abstract
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1. geoprocessing services and spatial data infrastructures

Environmental data, defined als information on the state of the Environment, is always spatial information[2]. Due to this fact data on environmental phenomena from different sources can be integrated by the spatial dimension. This spatial interrelation allows for a comprehensive analysis of interactions between environmental media (air, sediment, soil, water).

During the last five years the growing relevance of network techniques – esp. the World Wide Web – led to a paradigm shift in the GIS world. Geographical Information Systems currently undergo a change from monolithic systems with proprietary data structures to interoperable geoprocessing components serving different tasks.

The Open GIS Consortium is an important player on the scene. OGC specifications define standardized interfaces for geoprocessing services, the most important of which are Web Map Servers, Web Feature Servers, Web Coverage Servers and Catalog (Registry) Servers (OGC 1999-2001). They are allocated on different processing levels: While a Catalog Server works on the metadata level in providing information on where specific data and/or services may be found and how these could be accessed, Feature and Coverage Servers provide geodata (object-/field-based), and a Web Map Server returns ready-to-view rendered maps to users or client services.

A spatial data infrastructure is a collection of well-known geoprocessing services tied together to meet the specific requirements of an

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[2] Sometimes information without explicit georeferences like environmental legislation texts, taxonomies, and thesauri is denoted as environmental information.. This kind of information is useful to interpret data on the environment. It does not constitute statements on the Environment.

information community. Currently, many initiatives are brought on their way to build up spatial data infrastructures, e.g. – from global to regional scale level – Digital Earth, US NSDI, INSPIRE, GDI.DE, GDI NRW (IMAGI 2000, President´s Executive Order 12906, ...). They impressively demonstrate the huge impact of standards-based services on the outcomes, even in the case of quite 'simple' or 'flat' services as OGC WMS 1.0.0 compliant Web Map Servers (OGC 2000) in the Digital Earth project. Services providing access to deeper information (e.g. Feature/Catalog Servers) and widely used technical platforms (e.g. SOAP/WSDL/UDDI) will increase the interoperability potential even more, leading to application integration over information communities borders and to the wide-spread use of geoprocessing capabilities.

2. Environmental Data Infrastructures

Today, in the environmental domain interoperable geoprocessing services are poorly used to build up data infrastructures. Service-based infrastructures in Germany as the FIS-Broker project in Berlin or the EIS project in Baden-Württemberg don't exhaust the full potential of geoprocessing standards available today. Reasons for this shortcoming are primarily the temporally overlapping processes (project implementation vs. standards development) and the lack of know-how in the capabilitities of standardized services

The full use of standards-based Web Services in environmental agencies could open the way for an Environmental Spatial Data Infrastructure. The scenario for this case is that services which allow access to and retrieval of georeferenced environmental information resources are used to build Environmental Information Systems on different administrative levels, but most likely on federal state level. Specialized applications are used here for binding together these services to present the available information resources in an intuitive and easy-to-use way for the users of the regional environmental information system via the Internet. The same services could at the same time be part of collaborative, distributed systems taking together information resources (aka Web Services) and presenting them by national or even supranational environmental information portals. These portals would not only have the task of being registries of distributed services but also to integrate information resources and harmonizing them in regard to an integrative view on the data. They could, for example, offer the transformation of different spatial reference systems by transformation services.

A very important step in the development of such an Environmental Spatial Data Infrastructure would be to equip information systems which are already widely in use with standardized interfaces to allow their integration into other systems and vice versa to allow these systems to integrate others into their information resources. In Germany and Austria the Environmental Data Catalog (UDK) could, for example, become an OGC Catalog Server by providing its data via the standardized Catalog Interface (OGC 1999). The German Environmental Information Network (GEIN) would become a portal integrating services provided by the environmental agencies.

On the European level an 'Environmental European Spatial Data Infrastructure' (E-ESDI) is initialized (European Commission 2001).

3. References

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