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**THE NATIONAL SPATIAL DATA INFRASTRUCTURE FOR GERMANY (GDI-DE)  
MANAGEMENT ISSUES IN THE CONTEXT OF IMPLEMENTATION**

Submitted by Germany \*\*

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# **The National Spatial Data Infrastructure for Germany (GDI-DE) Management Issues in the Context of Implementation**

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## **Summary**

The report describes the status of the SDI in Germany. For the development of the German information and knowledge society, up-to-date geo information which is available all over the country is seen as an increasingly important key element. The German Federal Government launched activities for the provision of a national spatial data infrastructure (NSDI) in collaboration with the Länder, universities and industry. The explicit aim is to increase cooperation between data producers and data users and to provide up to date data in a most common available way.

Through the joint set-up of the NSDI for Germany [German designation: GDI-DE by the Federal Government, the states (Länder) and communes/municipalities], the potential of geoinformation is strengthened, primarily with regard to political, administrative, and economic decision-making processes. The GDI-DE creates the prerequisites for obtaining, evaluating and applying geoinformation on the basis of a National Geo Database (NGDB = validated set of reference data and thematic data and metadata for the nation), decentrally managed with the aid of a geoinformation network of services and standards. This can be guaranteed by means of transparent and open data retention as well as the construction of a user-friendly geodata portal on the Internet.

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## **1 Introduction**

Germany is a federal republic with 16 states (Länder). The structure of government has three distinct levels of public authority: local, regional and national, all of which are generators and holders of public information. This structure has an influence on the development of the German SDI.

Each of the Länder is responsible for its own topographic service, land and property register, environmental and statistical data collection, and in general for data policies. Data collection is largely decentralised and carried out mostly on the regional and local level, which means that the processing and maintenance of data is mostly tailored to local and regional requirements, which leads to a built-in incompatibility and falls for good communication, coordination and cooperation.

As regards the reference data as core component of a GDI-DE it is important to know that the different Länder have issued laws ('Surveying and Cadastral Acts') that regulate the work of the surveying and mapping authorities. The surveying and mapping administrations of the 16 Länder are responsible for creating and maintaining the reference data describing real-estate and landscape. Whereas the state mapping agencies of the Länder are responsible for providing large and medium scale reference data, the cadastre offices have to perform the tasks of the real estate cadastre and to support the work of the mapping agencies. There is an authorisation agreement between the federal administration and the Länder on the production of topographic reference data (including maps). All scales larger than 1:200,000 are done by the Länder, while the smaller scales are compiled by BKG, the Federal Agency for Cartography and Geodesy.

The BKG supports as a competence centre for geodesy and geoinformation the administrations of the

federation and the Länder. It advises the Federal Government in all questions related to geodesy and geo information and it safeguards the relevant German interests at the European and international level. BKG contributes to the establishment and the deployment of GDI-DE especially by providing the geodetic reference frame for Germany in the context of the IAG services (IERS, IVS, ILRS and IGS).

Coordination activities are deemed crucial in a federal system as Germany. Recently major initiatives have been raising the political profile of GDI-DE, as well as developing a framework for its coordination.

## **2 Details of the German NSDI: GDI-DE**

The implementation of the GDI-DE is planned in three logical steps according to a decision of the IMAGI in 2001:

1. The aim of the first step is to create harmonized access to information on geodata by means of a metabroker (called GeoMIS.Bund);
2. The second step aims at the preparation of the third step. Here the harmonization and cross-departmental co-ordination of feature catalogues as well as the development of standardized interfaces, conversion modules, georeference systems, standards and data integration procedures within the European context is done. A user requirements analysis has to be carried out;
3. The third step is the priority-oriented implementation of the NGDB.

The federal geodata portal [German Designation: GeoPortal.Bund] is a key component of the GDI-DE and will function as the central point of entry for Germany providing a large variety of services: search for data, visualisation of spatial data, e-commerce functions, etc. With the GeoPortal.Bund it is increasingly possible to obtain, evaluate and apply geoinformation, including thematic data, which will be interoperable with the data. The federal geodata portal will be linked to the geoportals of the Länder, as well as to specific sector databases and services. With regard to the planned EU (INSPIRE)-geoportal the GeoPortal.Bund will be able to act as a node of it.

One important component to providing the expanding federal government and the geodata market with the reference data of NGDB and making, is the Geodata Centre founded already in 1996 within the Federal Agency for Cartography and Geodesy (BKG).

### **2.1 Legal framework and funding**

#### **2.1.1 Legal framework and organizational issues**

There is no geoinformation law or NSDI act in Germany so far. The legal framework comprises decisions of the federal cabinet resolutions adopted by the parliaments of federal level as well as state level and agreements between public sector bodies. To improve the coordination of delivering geoinformation for the federal government the Federal Cabinet established in 1998 the IMAGI (Interministerial Committee for Geo-information) and transferred its secretariat to the BKG. The members of IMAGI ([www.imagi.de](http://www.imagi.de)) thus all are federal ministries and IMAGI tries to organize effective data collection and exchange among them on a federal level. The AdV (Working Committee of the Surveying Authorities of the States of the Federal Republic of Germany) attends the IMAGI sessions as a permanent guest.

Three decisions were adopted by the IMAGI already in 2001 on the strategy of the set-up of a national spatial data infrastructure (GDI-DE) based on resolutions adopted by the German Parliament in 2001 and 2003. In compliance with the latter resolution of the German Parliament the Chiefs of the Federal and States Chancelleries adopted a resolution on the establishment of the GDI-DE in November 2003.

In accordance with the resolution of the German Bundestag of 15 February 2001 on the "Use of geoinformation in Germany", IMAGI decides to push ahead rapidly and consistently with the setup of the German Spatial Data Infrastructure (GDI-DE) as a public infrastructure project, the scope of responsibility of the Federal Government constituting a first focus of efforts. The federal government is requested to report every four years of the progress made in the development of the geoinformation sector in national, European and international context to the German Parliament.

IMAGI is explicitly referring to European projects and initiatives as COGI, GI-GIS, EESDI (now the

INSPIRE initiative), EC Green Paper on PSI, EGIP, Panel-GI, EuroRegionsMap, EuroGlobalMap and SABE, besides national public and private initiatives, as steps forward to extensive access of Geoinformation.

IMAGI recognized that in order to ensure the sustainable and improved use of geodata, the projected setup of the GDI-DE must be implemented and performed in closer cooperation with the Länder. In April 2003 the German Parliament (Bundestag) debated the achievements and shortcomings, and urged the Federal Government to increase the efforts devoted to the establishment of the GDI-DE underlining the necessity of coordination of the GDI-DE activities at Federal level.

Further political directive came at the start of 2001 when the German Parliament, Bundestag, passed a resolution to rapidly implement the German SDI and promote the interdepartmental use of geoinformation in the public sector. It also established the coordination of geoinformation activities by the federal government, with support by the Länder and set about developing collaborations with the private sector and academia.

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In compliance with the resolution of German Parliament the Permanent Committee of the Chief Executive Officers of the Federation and the States adopted a resolution dealing with the set-up of a 3-level structure to coordinate the establishment of the GDI-DE in November 2003. In 2004 a steering committee GDI-DE representing GI expertise from state and federal level started its work.

*Within the GDI-DE Steering Committee representatives of the Federal Government, the Länder and the Central Associations of Local Authorities shall assume the political/technical and conceptual guidance of the development of the GDI-DE. Within the GDI-DE Steering Committee of the representatives of the Federation, the states and the communes/municipalities shall, under the political responsibility of the under-secretaries for e-government, direct and coordinate the further development and overall design of the Spatial Data Infrastructure for Germany in and for all administrative levels, and on a cross-departmental basis. The GDI-DE Steering Committee shall elaborate a harmonized concept allowing an open setup of a Spatial Data Infrastructure for Germany in the spirit of partnership, and also in the light of a European Spatial Data Infrastructure (ESDI) still laying ahead and waiting for realization in the foreseeable future. Above all, this Committee shall promote the strategies in part already existing and those being developed in the course of time and coordinate them for the purpose, benefit and needs of the setup of the spatial data infrastructure as specified above, which means on the levels of the Federation, the states, and the communes/local authorities.*

*Further, the task of this Body consists in providing support to the Federal Government in its efforts to push ahead the further development of standardization on a sustainable basis and across states boundaries. The GDI-DE Steering Committee defines the model projects required to establish and operate networked geoportals, to realize a networked metadata information system and for a sustained activation of cooperation of public and private sector including scientific actors in the field of geoinformation. It coordinates the realization of all projects according to the motto "some-for-all". It ensures the transfer of knowledge and process solutions among the states, the communes and the Federal Government. Practical implementation of this work will be assisted by a secretariat and coordination-centre GDI-DE through an appropriate project management. The secretariat and coordination-centre is filled with representatives both from the Federation and the states. Existing facilities and structures shall be made use of and parallel or double work be avoided. Moreover, with regard to practical work it is of importance that in a decentrally organized structure – which is typical for the geoinformation sector – the projects serving the establishment of the GDI-DE are supported also by the competent data holders and users.*

The organisational structure for the set-up of the GDI-DE has been approved and established in 2004. The GDI-DE Steering Committee and the Coordination Office (GDI-DE office), the latter one being established at BKG in Frankfurt am Main, are operating with the beginning of 2005. The GDI-DE organisation works in the political responsibility for eGovernment in Germany. The Steering Committee GDI-DE which started working at the end of 2004. The Steering Committee aggregates representatives from Federation, States and Municipalities in charge for SDI. Orders from the Steering Commit-

tee are carried out under the coordination of the GDI-DE office situated in BKG, Frankfurt. It's staff includes administrative officer from Federation and states.

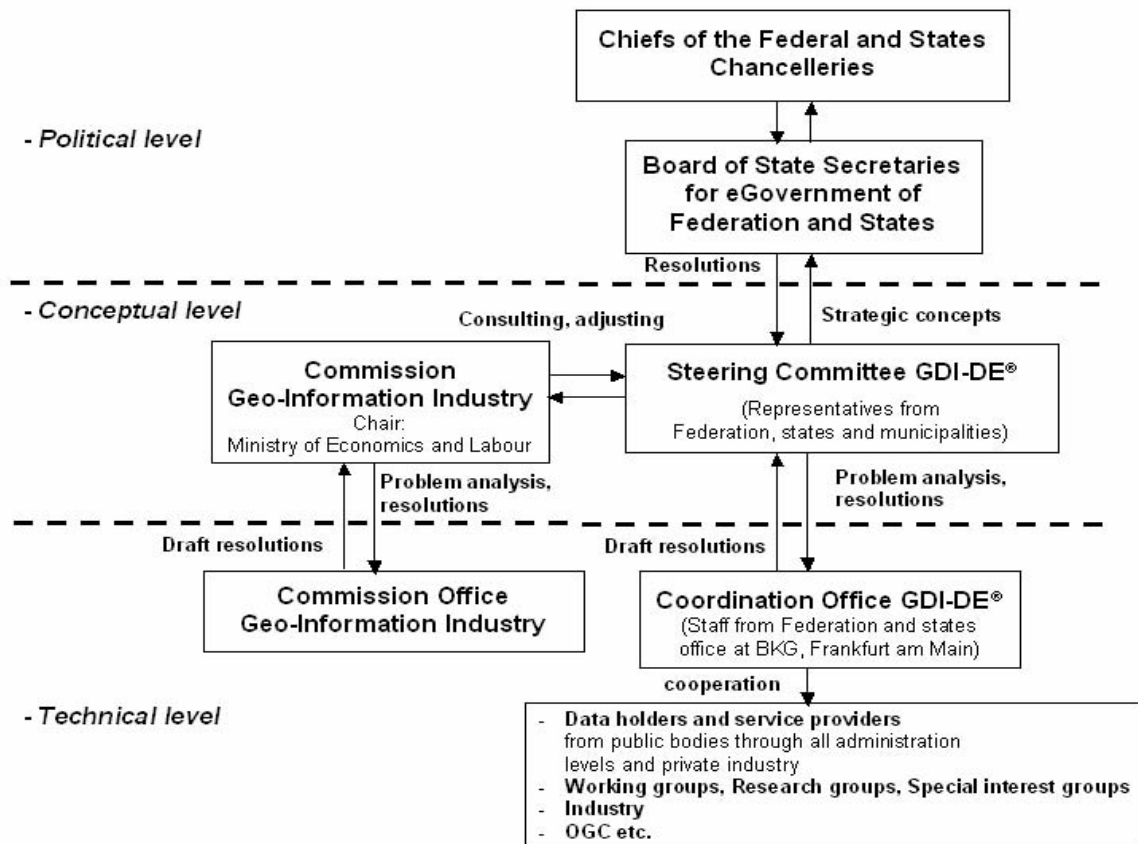


Figure 1: Organisational structure of the GDI-DE to integrate different administration levels of Federation, states, municipalities and the private sector

With the decision of the Permanent Committee of the Chief Executive Officers of the Federation and the States the task of building up a NSDI is clearly allocated in the political competence of E-Government, in character to the fact that a NSDI is building a strong base for E-Government processes.

### 2.1.2 Policy and legislation on access to public sector information (PSI)

A general federal freedom of information act has been enacted on the federal level in Germany that regulates the right of access to PSI, and also a general law dealing with the commercial re-use of public sector information.

A EC-Directive on access to environmental information has been implemented by the German Environmental Information Law (Umweltinformationsgesetz - UIG), which passed the German Parliament in December 2004. UIG defines the facilities which are affected, describes the access to environmental as well as rejection of access, active dissemination of environmental information and fees. It has entered into force on February 2005.

### 2.1.3 Restricted access to GI further to the legal protection of privacy

Protection of privacy has a long tradition in Germany and is considered tantamount to a human right. Hence privacy and personal data laws in Germany are generally very restrictive. Spatial datasets that contain information on individuals are in principle subject to the German laws on the protection of privacy.

The Federal Data Protection Act of 20 December 1990 (Bundesdatenschutzgesetz) - as already amended by the law of 14 September 1994 - was later amended by the Federal Data Protection Act of 18 May 2001. The Federal Data Protection Act applies to the federal public sector and the private sector.

#### 2.1.4 Funding model for SDI and pricing policy

Funding of the German SDI is considered the responsibility of the government because it is defined as a public infrastructure. NSDI activities on official level are hence financed by the respective administrations and only to a limited level co-financed by user fees. Currently only a small portion of the NSDI funding derives from user fees. Some public authorities are however converting to a different business model. It is recognized, for example, that tourist maps are commercially valuable, so the policy is to make some profit and go into competition with the private mapping sector.

Although the NSDI in Germany is completely provided by public administration or government, users have to pay for spatial data. Official core data (geobasic/reference and thematic data) that are supplied by the surveying, mapping, cadastral and other departmental administrations of the states are made available at the costs of economic value and dissemination. Variations do exist in the pricing policies of the different public authorities. The costs for geobasic/reference data are determined by the AdV. Responsibility for data policies and pricing guidelines rests with the Länder.

The new concept for data provision on the federal level encompasses that:

- (1) a certain set of general free information for non-commercial use will be distributed via the web,
- (2) standard products will be available to the user at fixed reasonable prices and
- (3) special services -if requested by the user-will be charged according to full cost recovery.

There is a clear understanding among them that the GDI-DE is a public infrastructure and that policies for access to the core data should hence be developed consistent with this vision.

## 2.2 Reference data and core thematic data

2.2.1 Scale and resolution: European, National, Regional, Local, Other  
Reference and core thematic data are produced at all these scale levels.

2.2.2 Reference data and core thematic data by resolution or scale range  
Reference data:

The product line ATKIS includes digital landscape of different resolution models, digital topographic maps and digital terrain models.

- Digital Landscape Models (DLM)

The DLMs describe the landscape and the relief of the earth's surface in terms of topographic features and in vector format.

The databases contain Digital Landscape Models (DLM) comprising the following six themes/feature types where each theme contains one or more data layers: settlements, transport, vegetation, hydrography, relief, other areas (e.g. islands, national parks, etc.).

- Basic-DLM (compiled from the scale range 1:5.000 – 1:25.000, horizontal accuracy +/- 3m)
- DLM 50 (in progress)
- DLM 250 (resolution 1:250.000, +/- 125m)
- DLM 1000 (content of 1:500.000, +/- 250 – 500m)

- Digital Topographic Maps (DTK)

The digital topographic maps (DTK) are being/will be derived directly from the DLM at scales

- 1:10 000 (DTK10)
- 1:25 000 (DTK25)
- 1:50 000 (DTK50)

- 1:100 000 (DTK100)
- 1:250 000 (DTK250) and
- 1:1 000 000 (DTK1000)

The production of DTK has started. During the construction phase the customers are provided with preliminary versions (DTK-V) that are obtained by scanning of conventional topographic maps at scales

- 1:25 000 (DTK25-V)
- 1:50 000 (DTK50-V)
- 1:100 000 (DTK100-V)
- 1:200 000 (DTK200-V)
- 1: 500.000 (DTK500-V) and
- 1:1 000 000 (DTK1000-V)

- Digital Terrain Model (DGM)

For the uniform description of the relief of the area of the Federal Republic of Germany in raster format - by a point set that is geo-referenced in position and height and that is arranged in a regular grid -the following Digital Terrain Models (DGM) of various quality degrees (high but also varying accuracies) are built up within the framework of the ATKIS Project by the German national survey administration:

- DGM 2 (partly available) (grid width 2-5 m, height +/- 0,2m)
- DGM5 (partly available) (grid width 10-20m, height +/- 0,5–1m)
- DGM25 (25m and 50m, +/- 1-8m)
- DGM50 (M745) (1"x1" ca. 30x20m, +/-20m)
- DGM250 (resampling of DGM 50) (200m, +/- 20m)
- DGM1000 (1000m, +/- 50-100m)

- Quasigeoid of the Federal Republic of Germany - SatNivGeoid

For the territory of the Federal Republic of Germany a combined satellite-geodetic gravimetric levelling quasigeoid (SatNivGeoid) was derived that allows the conversion of ellipsoidal GPS heights in ETRS89 with reference to the reference ellipsoid GRS80 and leveling heights in the DHHN92 (NHN) with an accuracy of 1cm in the plain, 2-3cm in the highlands and 3-5cm in the high mountains. The grid width in each model is 1'x 1,5' in geographical coordinates. The geoid is delivered for the whole territory of the Federal Republic of Germany or in four parts.

- Real Estate Cadastre – towards ALKIS®

The real estate cadastre is a description of the land with geographic reference, in the public interest, neutral to the parties concerned, comprehensive, up to date and reliable.

The ALB (Automated Real Estate Register) dataset includes information about the parcels (key numbers, location, area, history, cultivation, etc.), plot of land (key numbers from land register, type of property), stand of parcel (proprietor/owner).

The ALK (Automated Real Estate Map) dataset includes cadastral boundaries, land parcels, nature of use, buildings, special topography, name of streets and districts, house number, etc.). It is divided into subjects. The information, which belongs together from the technical point of view, is allocated to layers (e.g. complete data of buildings are brought together in one layer, the names of streets and water are integrated in another layer).

In the near future ALKIS (Authoritative Real Estate Cadastre Information System) is to replace existing solutions such as ALK and ALB and the coordinate register simultaneously and consistently – to reduce the duplication (redundancy) in collection -in a standardized and homogeneous information system with compliance to the ISO family of standards 19100 - geographical information.

In the long-term the present procedures ALK, ALB (as real-estate-describing data) and ATKIS (as landscape-describing data) as well as AFIS (geodetic control points network) are combined into the common application schema AFIS ALKIS ATKIS (AAA application schema) based on ALKIS, keeping a standardized and to large extent redundancy-free object view.

- Core thematic data on the national level exist partly in several federal agencies.

Following an agreement of public authorities on Federal and State level, the Federal Agency of Nature Conservation (Bundesamt für Naturschutz – BfN) holds surveying maps of sites for nature protection

(Nature Protection Sites, Landscape Protection Sites, Biosphere Reserves, Nature Parks, National Parks). Due to weak commitments in the agreement, the underlying database of geographic information is not sufficient for further analysis.

The Federal Institute for Geosciences and Natural Resources applies to a national database for an outline map for soils in the scale of 1:1 Mio and a map for bedrock geology in the same scale.

Distribution of ATKIS data

- by the survey administrations of the Länder for the scale range 1 : 5.000 to 1 : 100.000;
- by the federal Geodata Centre at the BKG for the scale range 1 : 5.000 to 1 : 100.000 in case of cross-border and nation-wide data requests, and 1 : 200.000 to 1.000.000.

For all thematic fields mentioned in the table above, reference and core thematic data is available within the private and public sector in Germany. In a compendium elaborated by a private company, an exhaustive list of data providers, their thematic focus, map examples, licencing framework, data format, data transfer (CD-ROM or internet) and access location or products' entry in a data catalogue (e.g. UDK) are compiled.

### 2.2.3 Geodetic reference systems and projections

Germany has one common Coordinate Reference System (CRS) with following characteristics:

- Datum type geodetic Datum anchor Lat=52°27'12.021" N, Lon=13°22'04.928" E point Germany, Rauenberg (near Berlin)
- Prime meridian identifier Greenwich 0°
- Ellipsoid identifier Bessel 1841 semi major axis 6 377 397.155 m shape true Ellipsoid inverse flattening 299.15281285
- Coordinate system identifier GK\_3 type projected dimension 2
- Coordinate system axis name X or Hochwert direction North, unit identifier metre, Coordinate system axis name Y or Rechtswert direction East unit identifier metre, Operation identifier GK\_3, valid area Germany, method name Transverse Mercator Projection Operation method name alias Gauss Krüger Operation method parameters number 7, remarks special German specification of Transverse Mercator Projection in zones of 3°, also known as Gauss Krüger System

There are algorithms available for the transformation into ETRS89 (European Terrestrial Reference System).

Digital topographic data sets can be supplied in various map projections:

- Gauß-Krüger (3°-longitude zones)
- UTM (6°-longitude zones)
- Lambert (conformal conical projection with 2 equidistant parallels of latitude in normal position)

Geoids or quasigeoids (e.g. Quasigeoid of the Federal Republic of Germany – SatNivGeoid) with an adequate accuracy for the direct conversion between GPS- ellipsoidal heights and reference heights from levelling are available.

### 2.2.4 Quality of the reference data

The federal Geodata Centre at BKG carries out quality control checks and harmonizes the topographic reference data which are delivered by the state mapping agencies of the Länder in order to provide the Federal Government with high quality geodata.

The definition of feature data (modelling rules) is presented in the ATKIS feature catalogue for digital landscape models.

Quality of data is flagged for common positional accuracy, common thematic accuracy, common actuality, common logical consistency and completeness. Digital topographic data are updated annually.

### 2.2.5 Interoperability

Digital topographic data are delivered in

- ArcInfo-EXPORT
- ArcInfo-GENERATE



- ArcView-SHAPE
- DXF
- CORINE Land Cover (in preparation)

A German-English glossary for interoperability terms is available

#### 2.2.6 Data Content

There are text explanations for attributes. The signature catalogues (with attributes and references for cartographic visualization) in ATKIS are documented in detail. Changes are also documented.

#### 2.2.7 Geographical names

The geographical names included in the ATKIS work (as attributes of the features) refer, depending on the scale, in particular to the following groups of topographical features: populated places, mountains, mountain ranges, rivers, lakes, seas, bays, islands and landscapes.

Furthermore, the BKG maintains two stand-alone databases of geographical names. These data bases contain names of the municipalities, villages and parts of municipalities, landscapes, mountains, islands, rivers, canals, lakes, seas and others. The database GN250 follows the scale 1:250.000 and contains about 46.000 entries. The database GN1000 follows the scale 1:1.000.000 and contains about 14.000 entries.

The BKG is owner, creator, administrator and distributor of these datasets. BKG is aiming at connecting the standalone geographical names databases with ATKIS with regard to UNGEGN rules.

### 2.3 Metadata for reference data and core thematic data

#### 2.3.1 Availability

Consistent metadata are produced for a significant part of the reference and core thematic data. With more and more geo-services becoming available, production of service metadata has started.

#### 2.3.2 Metadata catalogues availability and standards

28 metadata catalogues and 49 federal institutions which are responsible for the management of geodata were listed in an IMAGI information brochure "Geo Information in the modern state" (fourth extended edition, October 2004, including a multi media CD-ROM).

In 2004, the GeoMIS.Bund, a precursor of the federal geoportal, was established as an online meta-information broker and central entrance point to the metadata catalogs of the emerging German NSDI. As a interdisciplinary search engine on distributed metadata GeoMIS.Bund was the main interface for the enquiry of core thematic metadata in Germany. In 2005 GeoMIS.Bund was integrated in the federal geoportal (GeoPortal.Bund). At the present time there are almost 20 distributed metadata information systems connected to GeoPortal.Bund. They describe geodata regarding biota and environment, basic data, air, water, statistics, infrastructure, geology, farming (to be continued). GeoMIS.Bund has access to all UDK catalogs in Germany.

The UDK is a catalogue of data sources that was developed for the environmental ministries and agencies (on the federal and state level) in Germany and Austria. The UDK features a metadata model that complies with generic international standards (e.g., Dublin Core) and has, within the last 10 years, evolved into a de facto-standard for referencing environmental information. In Germany, the UDK catalogs maintained by federal and state environmental authorities can be accessed through a central internet portal (<http://www.umweltdatenkatalog.de>).

### 2.4 Access and other services for reference data, core thematic data and their metadata

#### 2.4.1 On-line access service for metadata of reference data and core thematic data

On the website of the GeoDataCentre of BKG, a metadata catalogue for topographic cartographic information systems, real estate information systems and geodetic fundamentals can be accessed. AdV also provides common documentation of the geodata available and functions as a point of entry for geodetic, topographic and cadastral data and the federal gazetteer of place names. Additional work is however needed for seamless search of data across themes for the country as a whole.

The GeoPortal.Bund has been set up by BKG on behalf of IMAGI to provide an internet application with web-based query tools for accessing federal information on geodata (topographic reference data as well as thematic data). GeoPortal.Bund will greatly facilitate access to and use of the databases (maintained decentralized). It is a platform-independent search system and incorporates all specialist

metadata information systems of the federal authorities. The catalog service of GeoPortal.Bund is a service available to authorities (federal administrations as well as for the Länder and communes), industry and the general public via internet. It provides users with metadata from fourteen distributed systems and a wide thematic range.

The GeoPortal.Bund are based on the ISO family of standards – especially on the ISO 19115, 19119, 19139 and OGC “ISO 19115/ISO19119 Application Profile for CSW 2.0” standards. With regard to the EU (INSPIRE)-geoportal the GeoPortal.Bund is able to form a node with this.

The environmental administrations in Germany agreed on the metadata information system UDK, which distinguishes classes as

- Data collection/Database
- Service/Application/Information system
- Document/Report/Literature
- Geographical information/Map
- Organizational unit/Task
- Plans/Projects/Programs

The on-line access to metadata as well as (in part) to the original data is realized. Important meta-information is given by subject domain, spatial domain, temporal domain as well as name, address and other information on the data owner.

#### 2.4.2 On-line access service for reference data and core thematic data

ATKIS (Authoritative Topographic Cartographic Information System) data can be obtained via internet. ATKIS is an information system initiated and developed by the AdV and the BKG which is performed uniformly at the federal level. This information system aims at the provision - under public law - of digital object-based Landscape models of the Earth's surface suited for data processing. ATKIS constitutes a database for computer-assisted digital processing and analog output forms, but also a base of spatial reference for the linkage to and combination with technical geothematic data.

Satellite data and their metadata can be obtained via the DLR EOWEB (Earth Observation WEB) Satellite Data Information Service, a data catalogue of the German Remote Sensing DataCenter (DFD). Thematic maps are also available. Links are provided to further map catalogue access services like Links: World Data Centre (for atmospheric data, CEOS data catalogue/archive).

The on-line access for core thematic data of environmental administrations is realized by the German Environmental Information Network GEIN ([www.gein.de](http://www.gein.de)). GEIN brings together a wide range of information currently distributed across many different web sites run by public organisations in Germany, such as environmental authorities, agencies and ministries at the federal and Land (state) levels. It acts as an information broker for environmental information in Germany, or - as GEIN claims for itself: as "the portal for environmental issues".

GEIN currently presents nearly 100 suppliers of environmental information from governmental authorities and other public institutions at the federal and Land levels. This offer encompasses:

- more than 180,000 individual Web pages,
- numerous database interfaces (dynamic Web content),

such as, for example, to the catalogues of environmental data sources (UDKs) compiled by the German Federal Government and the various German federal Länder (states). The new feature is that GEIN makes these dynamic Web offers, which otherwise are hidden to conventional search engines, accessible to the user. This function is of special importance, as such databases mainly contain data on specific subjects and it makes these data easy to retrieve together with other information.

As of 2006, the UDK and GEIN will be merged into one new system, Portal-U. This system will fully incorporate the data and the functionality of the UDK (including the UDK metadata model and OGC catalog interface), and at the same time implement and extend the functionality of the former [gein.de](http://www.gein.de). Thus Portal-U will provide both direct access to environmental data and to the respective metadata through one interface. Within the German NSDI, Portal-U will replace the UDK as the major source for environmental meta-information and data.

#### 2.4.3 OpenSource software and access services

The German Environmental Information System GEIN uses a central and proprietary server installation. Databases and other online information systems can be linked to GEIN through a proprietary interface. Participation in GEIN is open to all federal and state authorities.

As of 2006, Portal-U will replace both UDK and GEIN. The Portal-U software will be built entirely on the basis of OpenSource components. Free distribution of the software will be possible to all members of the UDK/GEIN administrative agreement. Metadata managed by the system can be accessed through a standard OGC CSW-2.0 compliant catalog interface. The same catalog interface is available to connect Portal-U to other data catalogs. Databases and online information systems that do not support the OGC CSW specification can be linked to Portal-U through an easy-to-configure connector software based on a proprietary interface specification. An integrated OGC-compliant webmapping service (WMS) will be available for the visualization and interpretation of geospatial data.

#### 2.4.4 Availability of geo-processing services

Algorithms to convert GI between coordinate systems and to ETRS89 (European Terrestrial Reference System 1989) are available on [http://crs.ifag.de/country\\_select.php?country=DE](http://crs.ifag.de/country_select.php?country=DE).

### 2.5 Thematic environmental data

#### 2.5.1 Application of the legal framework and funding principles (for reference & core thematic data) to thematic environmental data

In the context of the agreement of environmental authorities on federal and the following funding principle was founded: 450 T€/a were spent for running the current UDK/GEIN, paid half by federal level, half by state level. For further developments of the common system UDK/GEIN 300 T€/a are planned. 75 % of that amount is paid by the federal level, 25 % by state level.

For all thematic fields environmental data is available within the private and public sector in Germany. In a compendium elaborated by a private company, an exhaustive list of data providers, their thematic focus, map examples, licencing framework, data format, data transfer (CD-ROM or internet) and access location or products' entry in a data catalogue (e.g. UDK) are compiled.

Entries in the UDK are provided by different agencies and public bodies. Therefore, various characteristics, metadata specifications, standards and update procedures apply.

Every year, research projects of 450 mio. € which are producing geodata [as main or by-product], are funded by the German Government. A volume of more than 250 mio € is estimated for the geodata market in Germany, with annual growth rates of 10-30%. Thus, an increase of high quality employments is expected.

## 3 European and International Context

German experts have been contributing to international standardization geodesy and geoinformatics and continue to do so in

- the ISO TC 211 working groups,
- the CEN working groups

Since the start of the European projects Infrastructure for Spatial Information in Europe (INSPIRE) and Global Monitoring for Environment and security. German experts have been contributing to the many themes like data specifications and architecture, data dissemination etc.

In the GDI-DE development is the specs of these international and European activities are taken into account.

Especially, BKG is also contributing significantly to EuroGeographics, the association of the National Mapping and Cadastre Agencies in Europe, especially by operating the production centre for EuroBoundaryMap (EBM) and providing the geodetic reference system (3D) for Europe.

Table: list of references used

<http://www.geodatenzentrum.de> <http://www.leipzig.ifag.de/>  
<http://www.atkis.de>

<http://www.imagi.de>  
<http://www.bkg.bund.de>  
<http://www.caf.dlr.de/caf/satellitendaten/datenzugriff>  
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[http://crs.bkg.bund.de/country\\_select.php?country=DE](http://crs.bkg.bund.de/country_select.php?country=DE)  
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#### Acronyms

AdV	Working Committee of the Surveying Authorities of the States
ALKIS	Official Real Estate Cadastral Information System
ATKIS	Authoritative Topographic-Cartographic Information System
BfN	Bundesamt für Naturschutz (Federal Agency of Nature Conservation)
BKG	Federal Agency for Cartography and Geodesy
CRS	Coordinate Reference System
CT	Core Thematic Data
DDGI	German Umbrella Organisation for GI
DFD	German Remote Sensing Data Centre
DGK	German Geodetic Commission
DGM	Digital terrain model
DHM	Digital elevation model
DLM	Digital Landscape Model
DLR	German Space Agency
DTK	Digital Topographic Map
ESDI	European Spatial Data Infrastructure
FIG	dictionary of names and definitions for surveying and mapping
GDI-DE	Geodaten-Infrastruktur Deutschland
GDZ	Federal Geodata Centre
GI	Geographical Information
GINIE	Geographic Information Network in Europe
GIS	Geographical Information System
GPS	Global Positioning System
IMAGI	Interministerial Committee for Geo-information
INSPIRE	INfrastructure for SPatial InfoRmation in Europe
GEOS	Global Earth Observation System of Systems
GMES	Global Monitoring for Environment and Security

#### References

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*GDI-DE* (2006) : Update report on the report "Spatial Data Infrastructure in Germany (2005)", GDI-DE office, Frankfurt am Main 2006