

# **Geospatial Reference Data as Public Sector Information - Involvement of the Surveying and Mapping Authorities – The German Way**

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**Key words:** Geospatial reference data, public sector information, SDI, pricing

## **SUMMARY**

In Germany the federal government, the federal states and the local level build the Spatial Data Infrastructure Germany (GDI-DE) together. Doing this, the potential of geographic information, particularly for political as well as administration- and economy-relevant decision processes is increased.

The surveying and mapping authorities in Germany play a very important role by providing the geospatial reference data („Geobasisdaten“). They consist of the geodetic reference data, the cadastral textual and graphical data and the topographic data (landscape models, terrain models and digital orthophotos). It belongs to the objectives of the Official German Surveying and Mapping to provide these data not only for the public but also for the private sector. The geospatial reference data are the first link of a value added chain.

The main advantages of the public data are

- collection of geospatial reference data is an infrastructural measure (task by rights) and so data are reliable (branded as “official”)
- coverage of the whole country and not only of special („interesting“) areas
- update is guaranteed
- same conditions for all customers are guaranteed.

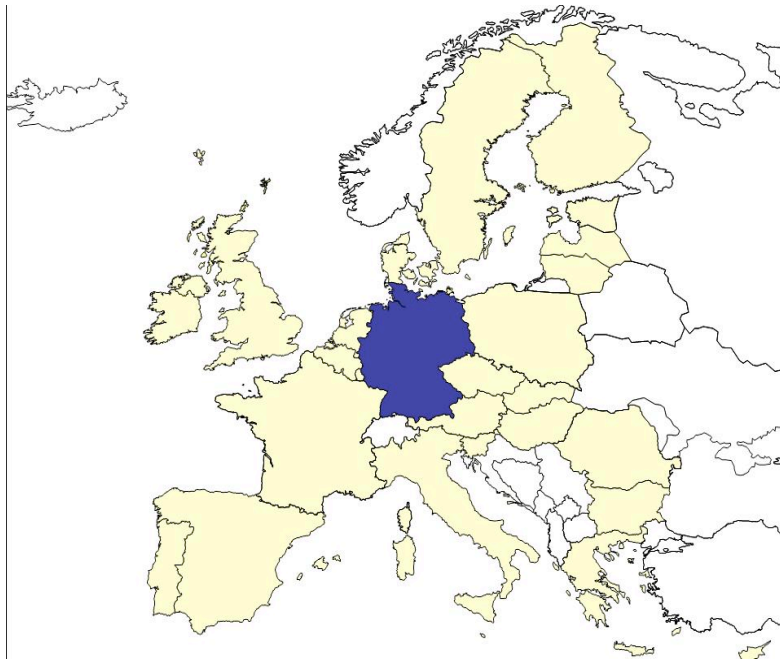
There is always a discussion if public data should be available as “free of charge” or not. Viewing is free (definition of viewing may be difficult). But in Germany the surveying and mapping authorities are of the opinion that the use of the data for further products should not “free of charge”. Due to the German constitution the 16 states are independent in their pricing policy (as well as in the legislation for the geoinformation sector). Fees are regulated by law (or bylaw) and therefore they may vary from state to state and follow both the „benefits received principle“ and the „cost recovery principle“ (no full cost recovery, but cost recovery for updating and administration). Exclusive license usage right for one customer is not allowed. Fees are effective both for private persons / institutions and public bodies.

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## 1. FACTS ABOUT GERMANY

Germany, officially the Federal Republic of Germany (German: Bundesrepublik Deutschland) is a country in Central Europe and is one of the founding members of the European Union. It is bordered to the north by the North Sea, Denmark, and the Baltic Sea; to the east by Poland and the Czech Republic; to the south by Austria and Switzerland; and to the west by France, Luxembourg, Belgium, and the Netherlands. The territory of Germany covers 357,021 km<sup>2</sup> and is influenced by a temperate seasonal climate. With over 82 million inhabitants, it has the largest population of any member state of the European Union (Fig. 1). The capital and largest city is Berlin. Germany is a federal parliamentary republic of sixteen states (in German: Länder). As surveying and the full scope of tasks related to geoinformation are not mentioned at all in the German constitution (Grundgesetz, GG), so Article 70 (1) GG, assigning the legislative authority to the 16 German states in this case, applies.



**Fig. 1 European Union - Germany**

## **2. WORKING COMMITTEE OF THE SURVEYING AUTHORITIES OF THE STATES OF THE FEDERAL REPUBLIC OF GERMANY (ADV)**

As official surveying and mapping in Germany is task of the federal states there has been a necessity to harmonise these activities. In order to achieve, further develop and maintain extensive harmonisation and standardisation, representatives of the American Zone surveying and mapping authorities met already in May 1948. In October 1949, the working group, expanded by the surveying authorities of the British and French Zone was formed and has borne the name (“AdV” - Working Committee of the Surveying Authorities of the States of the Federal Republic of Germany) it has today since this time. Today the surveying and mapping authorities of all federal states are members of AdV, an organisation on a voluntary basis, responsible for the coordination of official surveying and mapping. As well as the specialist authorities of the federal states responsible for official surveying and mapping, the Federal Ministries of the Interior, Defence and for Traffic, Construction and City Development are cooperating in the AdV.

## **3. GERMAN SPATIAL DATA INFRASTRUCTURE (GDI-DE)**

### **3.1 General information**

The German Spatial Data Infrastructure (GDI-DE) is a joint project of the federal government, federal states and local authorities. The joint establishment of the GDI-DE has enhanced the potential of geoinformation, especially for political decision-making processes with an administrative and economic relevance. Decisions in all social sectors are supported and industrial value-added services are initiated. By 2003, the head of the Federal Chancellery and the heads of the State and Senate Chancelleries in Germany passed a resolution for establishing the GDI-DE and its future organisation. For the political and conceptual level, the government, states and local authorities have set up the GDI-DE steering committee. To gear the services specifically to the demand for geoinformation within the GDI-DE, the steering committee is being provided with an advisory board in the form of the German Commission on the Economics of Geo-Information (GIW-Commission), in which key representatives for the economy are involved. Fig. 2 shows the structure of German spatial data infrastructure.

On the GDI-DE steering committee, government, state and local community representatives appointed department-wide for E-government control, with political responsibility for the secretary of state, the development and formation of the spatial data infrastructure in Germany and for all administrative levels. The GDI-DE steering committee has devised a coordinated concept for the joint and open establishment of a spatial data infrastructure in Germany, and in view of a European spatial data infrastructure which also has to be set up. Resolutions of the steering committee are passed unanimously. They are agreed beforehand across the affected departments of the government and state administrations and as such accepted on a broad basis.

## Spatial Data Infrastructure Germany GDI-DE

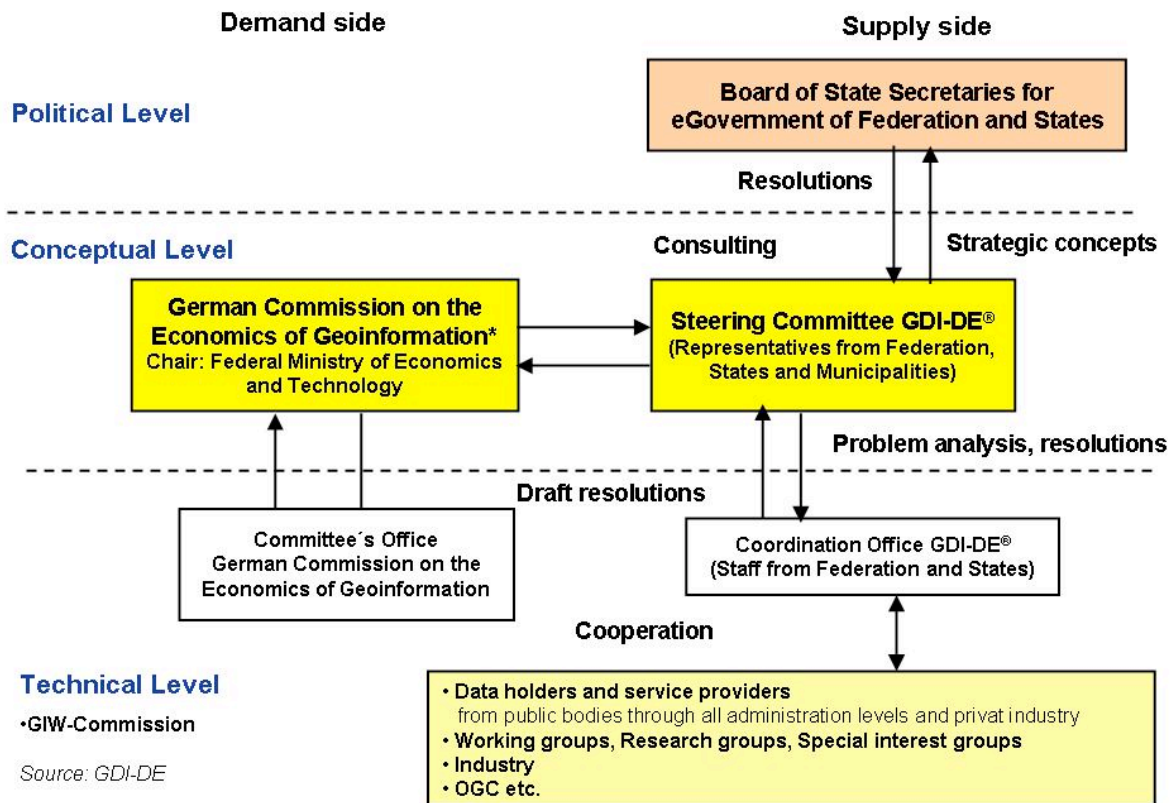


Fig. 2 Structure of German spatial data infrastructure

The GIW Commission aims to group together and formulate the needs of the economy for state geoinformation and to help by making recommendations to the politicians and taking into consideration sector-specific project activities. The GIW Commission is made up of representatives from practically all sectors requiring geoinformation in their business processes. These include the supply and disposal sector, tourism, mining, the trades, insurance industry, financial and real estate industries, advertising industry and agriculture and forestry.

### 3.2 AdV and GDI-DE

Geospatial reference data as public sector information (e.g. cadastral information, topographic data) are used as the basis for the presentation and evaluation of all spatially-referenced technical subjects. Therefore, an interdisciplinary spatial data infrastructure (SDI) without geospatial reference data is unimaginable. The AdV has been concentrating for a long time on a SDI-compliant provision of the geospatial reference data satisfying the user requirements by the

federal states. As well as the conventional tasks of state surveying and mapping and of the real estate cadastre, fundamental portal, basis and activation functions for the entire field of geoinformation are assigned to German official surveying and mapping, represented by the AdV, as a new area of responsibility: Provision of standardised and integrated geospatial reference data, expansion of the geo-network, setting up the geodata portals and development of the geographic data services. These are the supporting elements of the spatial data infrastructure. Thus, a central function in collaboration with the geotechnical authorities and the GIS business for expansion of the GDI-DE is accorded to the AdV. The standardised geodata basis is provisioned via the geodata portals. The expansion of GDI-DE is achieved by merging the SDI in the states and with that of the federal government. The geodata portals, to which the respective geodata servers are assigned via geodata buses, are networked for this. This national network establishes the connection to the European and worldwide SDI (Fig. 3) (Kummer, Pischler, Zeddies 2006). This includes provisioning the geospatial reference data using standards-compliant services, for example using Web Map Service (WMS) or Web Feature Service (WFS).

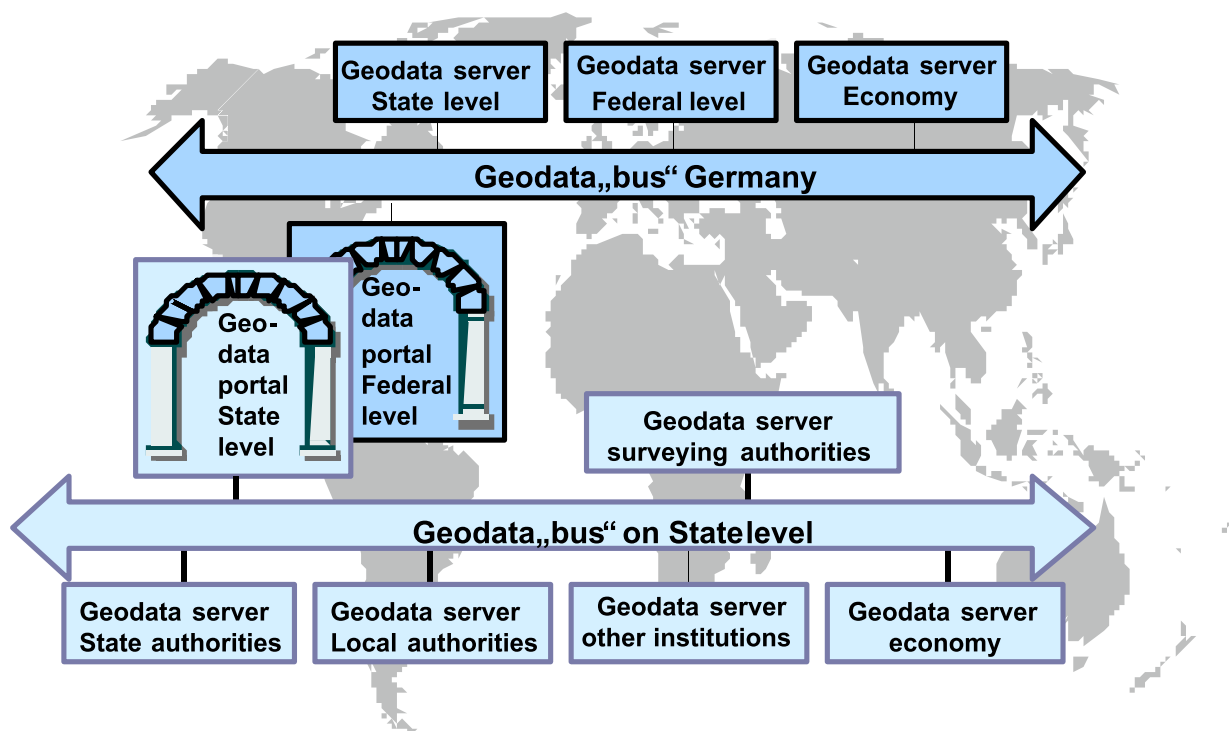


Fig. 3 Spatial data infrastructure networking

## **4. GEOSPATIAL REFERENCE DATA**

### **4.1 Strategies for provision of the geospatial reference data in compliance with GDI-DE**

In collaboration with the GDI-DE, the WMS-DE Profile V.1.0 which the federal states should use as a service in the future for the visualisation of their geospatial reference data and the WFS-G Profile (Gazetteer Service) which makes possible a standard-compliant provision of the house coordinates of the federal states have been specified and approved by the AdV in the meantime. The federal states are currently implementing WFS-G.

The networking of metadata databases should be performed nationally using the Catalogue Service Web (CSW) (AP ISO 2.0) by means of which the individual metadata catalogues of the federal states should be integrated in the Geodata Catalogue Germany of the GDI-DE. Currently, this service is being adapted with respect to metadata to the requirements from the Regulation (EC) No. 1205/2008 for carrying out the INSPIRE Directive in order to be able to comply with the obligations from INSPIRE (AdV2009).

But it has to be taken into consideration that the official surveying and mapping is only responsible for the geospatial reference data. The geo-specialist data are partly content of the data stored in the databases of the official mapping and cadastral authorities, but were captured by other authorities.

### **4.2 AAA model as contribution to GDI-DE**

AdV as the umbrella organisation of the official surveying and mapping has made a significant contribution to the development of the new organisational structure. The involvement of the state surveying authorities is ensured both by a direct representation for the state concerned in the steering committee (14 of 16 states) and also via the projects in the GDI-DE supported by the state survey offices. This goes hand in hand with the existing co-operation of the AdV with the inter-departmental committee for geoinformation (IMAGI). In addition to this, the AdV plays an important role in developing necessary procedures and technologies as well as in the distribution and application of standards. Special reference must be made to the ISO-based data model for AFIS<sup>®</sup>, ALKIS<sup>®</sup> and ATKIS<sup>®</sup> (AAA model) at this juncture. The data model describes the structure and composition of geospatial reference data in a future-oriented manner and is the pre-requisite for integrating technical data (AdV 2004). Here, AFIS<sup>®</sup> stands for the Authoritative Control Point Information System, ALKIS<sup>®</sup> stands for Authoritative Real Estate Cadastre Information System, ATKIS<sup>®</sup> stands for Authoritative Topographic-Cartographic Information System.

Hence, the AAA data model described makes a fundamental technical and practical contribution to GDI-DE. In return, the development of GDI-DE applying the concept concerned will entail a considerable development surge for its distribution and application.

The information and communication technology working group of the AdV coordinates the SDI activities for the AdV with respect to information technology. In order to support the

rapid SDI development and to guarantee core skills and expert knowledge for AdV in data modelling, data exchange and geoservices, the SDI Standards project group was established already in 2004. The clear positioning of the official surveying and mapping within the SDI has significant importance. However, the geospatial reference data form the core component of the national SDI.

In this context, the measures that enable the web-based, widespread provision of geospatial reference data must also be covered. The AdV has decided on an actions catalogue for this; its implementation has been started, the result being that the surveying and cadastral authorities make an important contribution to E-government.

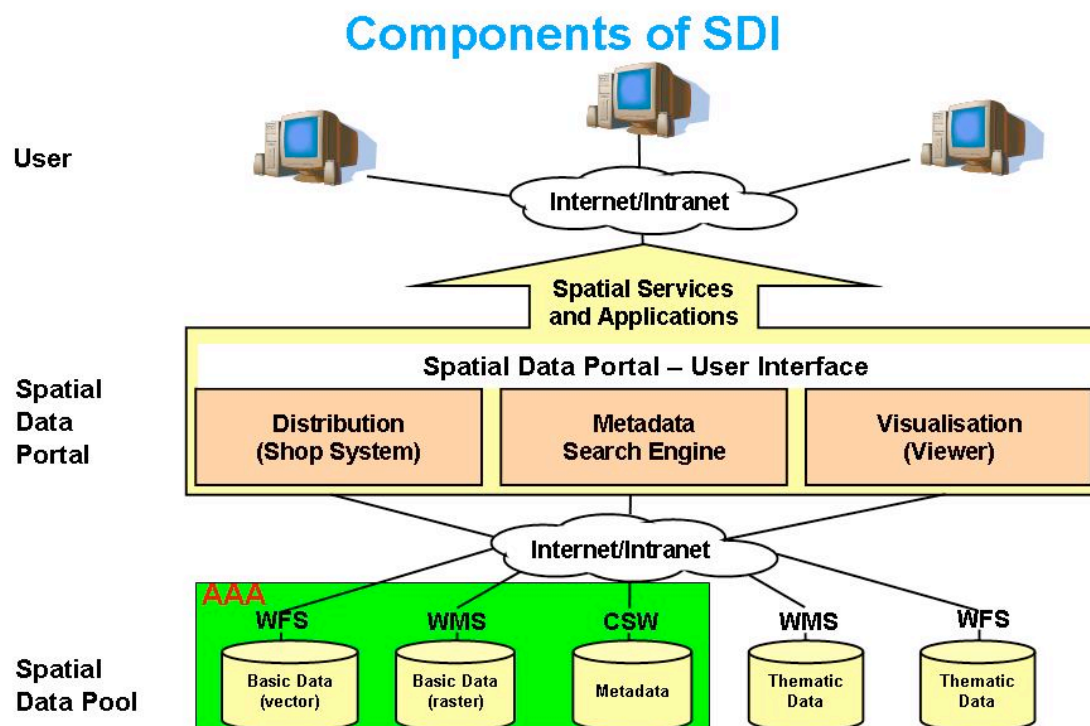


Fig. 4 Components of SDI

Back in 2004, the AdV adopted a resolution for providing the raster data of topographic maps as standardised WMS services. Consequently, the task force became involved with specifying the WMS application profiles for the geospatial reference data as the prerequisite for nationally standardised data provision.

The data provisioned by the surveying authorities of the states for GDI-DE from the AAA model are highlighted in Fig. 4 in green.

### 4.3 Product catalogue of the German surveying and mapping authorities

The surveying and mapping authorities in Germany are „the“ providers for geospatial reference data. These data are the basis for all other datasets within a spatial data infrastructure and they belong to the public sector information. It is the intention of the surveying and mapping authorities that the geospatial reference data as public sector information shall be used in the economy. They are the first link of a value chain.

The main advantages of these public data are

- the collection of geospatial reference data is an infrastructural measure (task by rights) and so data are reliable (branded as “official”),
- the data cover the whole country and not only special („interesting“) areas,
- the update is guaranteed and
- the same conditions for all customers are guaranteed.

As these data are public data, there apply some general rules. So it is not allowed to concede exclusive license usage rights for one customer and fees are always effective both for private persons / institutions and public bodies.

The following geospatial reference data are provided from the German surveying and mapping authorities:

The Authoritative Control Point Information System AFIS<sup>®</sup> comprises information on the geodetic spatial reference ((3D position, position and height and physical gravity values) as well as information of the satellite positioning system SAPOS<sup>®</sup> and of the quasi-geoid.

The Authoritative Real Estate Cadastre Information System ALKIS<sup>®</sup> comprises the descriptive and illustrative cadastral components.

The Authoritative Topographic-Cartographic Information System ATKIS<sup>®</sup> comprises the following data sets:

Digital landscape models (the number indicates the scale denominator in 1000)

- DLM25 (“Basis-DLM”),
- DLM50,
- DLM250 and DLM1000 (processed in the Federal Agency for Cartography and Geodesy),



Digital terrain models (the number indicates the grid width in meter)

- DGM1 (not in all federal states),
- DGM2 (not in all federal states),
- DGM5 (not in all federal states),
- DGM10,
- DGM25,
- DGM50,
- DGM200 and DGM1000 (processed in the Federal Agency for Cartography and Geodesy)

Digital cartographic models (the number indicates the scale denominator in 1000).

- DTK10 (only in some federal states),
- DTK25,
- DTK50 and DTK100 as joint civil/military map,
- DTK250 and DTK1000 (processed in the Federal Agency for Cartography and Geodesy).

Digital orthophotos with a resolution of 40 cm (DOP40), in some federal states already 20cm (DOP20).

Generally the State survey offices and the cadastral offices are the distribution points within the 16 federal states for the above mentioned data sets. But certain product groups are provided nationally and harmonised using three central distribution centres:

- the SAPOS<sup>®</sup> central office provides satellite positioning data usable for cadastral (part of the German reference system) as well as technical surveys and navigation in coastal areas,
- the Association for Distribution of the House Coordinates and House Outlines provides georeferenced house numbers and house outlines (derived from the cadastral data) and
- the Geodata Centre of the Federal Agency for Cartography and Geodesy provides the institutions of the federal government and in case of national cross-border demands other customers with geospatial reference data.

Furthermore the official valuation information determined by the expert committees for land parcel values can / will be provided in a standardised and SDI-compliant manner using VBORIS. For the realisation of the VBORIS concept adopted by the AdV, a central information system platform ([www.gutachterausschuesse-online.de](http://www.gutachterausschuesse-online.de)) linking all existing standard ground values information systems of the federal states with each other has been activated. Since mid-2009, standard ground values from a total of ten federal states have been accessible via the joint portal; VBORIS is thus implemented in compliance with GDI-DE based on the AdV modelling by six federal states, five federal states are able to deliver digital data in older formats and by end of 2011 the system will be implemented in compliance with GDI-DE in 14 of 16 states. The objective is to make the standard ground values useable not only in the provided federal state portals but also interoperable for other applications. This will make it conceivable to present the standard ground values centrally in one application for the entire Federal territory (AdV 2009).

## 5. GEOINFORMATION INDUSTRY AND PRICING

Geoinformation represents a key raw material for value creation in many sectors of industry. They form a qualified planning and decision-making basis for companies. The cost-efficient use of geoinformation has a high economic potential, which generates impetus for the economy as a whole. Industry's requirements for the content and provisioning of geoinformation have been analysed in a number of different ways. In particular, the following needs and requirements of industry for activating the geodata market can be formulated:

- Data records are to be obtainable via standardised and transparent price models (e.g. flat rate, click rate, commission) and geared towards market and user;
- Data records and systems are to be equipped with business-oriented submission conditions (rights of use, data protection) and readily available;
- Data records and systems should be current, inter-operable and high quality in terms of technology and content (GDI 2007).

May 2009 saw the 1st Workshop of the TaskForce "GeoBusinessPricing" of the GIW Commission, which was attended by representative of the GIW Commission, the GDI-DE, the AdV and the geoinformation business (including the industry association for non-metallic mineral processing, chamber of commerce and industry, umbrella association for the German insurance industry). The fee structures of the authorities for the provision of official geoinformation from industry's perspective were highlighted. It was established that the existing fee regulations for the use of geoinformation by the surveying and other technical authorities represents a huge challenge for creating business processes based on official web services. The aim is to formulate requirements placed by the geoinformation sector on fee structures, especially for the use of web services. Further workshops are planned for 2010 in order to achieve a common understanding in the interests of industry as data users and the surveying authorities as providers of geospatial reference data.

Furthermore there is always a discussion if public data should be available as "free of charge" or not. Viewing is free (the definition of the possible content of "viewing" may be difficult). But in Germany the surveying and mapping authorities are of the opinion that the use of the data for further products should not "free of charge". Due to the German constitution the 16 states are independent in their pricing policy (as well as in the legislation for the geoinformation sector). Fees are regulated by law (or bylaw) and therefore they may vary from state to state. They follow both the „benefits received principle“ and the „cost recovery principle“ (no full cost recovery, but cost recovery for updating and administration).

In 2007 the AdV decided on a new scale of fees ("AdV-Gebührenrichtlinie"). Due to the constitutional situation in Germany the members of AdV could only decide that the fees will be valid for the central distribution centres. For the scale of fees in the federal states this decision is only a recommendation. But meanwhile the surveying and mapping authorities of the federal states have started to transpose the new regulation into their state regulations. As it is a

complex document, there is a working group providing comments and advices to achieve a common use of this scale of fees in all of the federal states.

As there is a demand for some "free data", the AdV will stipulate before the end of 2010 which products are to be provided throughout Germany free of charge. Today there are already in some states datasets (mostly raster format) available free of charge. Examples are Topographic Map 1:50.000, Overview Map 1:500.000, Digital Orthophotos (DOP) with 2 m ground resolution. These data are only free for private, not for commercial use.

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WWW-Links:

Arbeitsgemeinschaft der Vermessungsverwaltungen der Länder der Bundesrepublik Deutschland (AdV): [www.adv-online.de](http://www.adv-online.de)

Geodateninfrastruktur Deutschland – Eine Initiative von Bund Ländern und Kommunen für den Aufbau einer länder- und ressortübergreifenden Geodateninfrastruktur Deutschland (GDI-DE): [www.gdi-de.org](http://www.gdi-de.org)

## BIOGRAPHICAL NOTES

Wilhelm Zeddies (62) is Secretary General of the Working Committee of the Surveying Authorities of the States of the Federal Republic of Germany (AdV), the umbrella organization of the surveying authorities. In this function he represents AdV in the Permanent Committee on Cadastre in the European Union (PCC) and is Permanent Correspondent for AdV in EuroGeographics.

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