Working Committee of the

Surveying Authorities of the

States of the Federal Republic of Germany

Progress Report

2001

Cover illustration:

“Points of reference throughout the ages”

In the shade of the 368 m high televisiontower built in 1969 at Berlin Alexanderplatz there is the 91 m high tower of the Berlin Marienkirche (1270/1790).

The German primary triangulation network (DHDN, 1870 to 1950) based on the Besselian ellipsoid as reference surface, got its orientation from the astronomical azimuth of the line between the fundamental point Rauenberg and Berlin Marienkirche.
DGNSS-correction data for orientation and navigation in the European Terrestrial Reference System 1989 (ETRS89) are broadcast via 2-m-band VHF-transmitters from the televisiontower at Berlin Alexanderplatz.

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www.atkis.de
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Data capture and maintenance of geodetic, topographic and real estate data, as well as the supply of customers with geospatial datasets are the public and statutory task of each state of the Federal Republic of Germany in close co-operation with the federal authorities. The depiction of the landscape, as performed and realised by spatial reference systems, maps and digital models in state survey and real estate cadastre, is state overlapping and comprises the whole territory of the Federal Republic of Germany. This is the reason, why the 16 states (Länder) are responsible for the Federal state territory as a geographical unit. The former President of the Federal Republic of Germany, Roman Herzog, described this very aptly: „We have to take federalism seriously. Just as we must have the courage to allow differences, there are limits to the representation of particularistic interests. Here the representatives of the states are asked to take over responsibility for the Federal Republic as a whole."

A central quality feature of official geospatial datasets is their area covering uniform availability as regards content and technical structures. In order to further develop the resulting value added potential, the Working Committee of the Surveying Authorities of the States of the Federal Republic of Germany (AdV) has been successfully coordinating the federal jigsaw puzzle. Only the assembly of it's pieces provides customers with economically usable basic data that could be sold well. Therefore, the implementation of AdV decisions concerning capture, maintenance, supply and use of geospatial data is of utmost importance.

With the answer from September 2000 to the Parliamentary question "Use of Geoinformation in the Federal Republic of Germany", the Federal Government has clearly underligned and declared it's support for the traditionally high importance of the use of geospatial basic data in planning and administration of the Federal Republic and the states (Länder) and as an economic factor (printing of the German Bundestag (Parliament) No. 14/4139). Particular importance has been identified for the public access to data that are being used directly or indirectly by half of all economic branches for their work. The following parliamentary debate has given broad and profound support for this vote from all political parties. The Bundestag has adopted a resolution proposal requiring the strengthening of geoinformation as a whole, the state overlapping extension of value added potentials by investments into the national geospatial data infrastructure, the simplification of data access procedures, the extension of the international position of Germany in these matters and strong political support. The resolution proposal is attached to this progress report.

Against this background, plans for reform of the public surveying and mapping are very important projects and it is certainly a mistake to let them degenerate to a discussion on cost reduction issues alone. Considering the current economic situation of the state, economic points of view of course enjoy a great significance. But their consideration must end, where legal and economic key interests of the citizens and the public at large could be jeopardised or at least be seriously harmed. A transfer of profit-oriented business strategies to the public administration without thinking has to be ruled out. The cost and revenue structures of the survey administrations cannot simply be tuned to the requirements of business economics, the consequences from political economy also need to be taken into account: Financial constraints on the necessary basic works prevent the demand driven provision of geospatial data and the implementation of the above decisions. This, inter alia, has been one reason for customers, including other parts of the administration, to develop their own information systems and environments. The examination of measures for minimising costs in the survey administrations should not be unbalanced and we should not lose touch with the overall cost development in public administrations and on the customer side.

This economic aspect is particularly being considered by AdV. With this leaflet we submit our progress report for the period from September 2000 to August 2001.

Heinrich Tilly	Peter Creuzer
President of AdV	Secretary General of AdV

1 Organisation

Official Surveying in the Federal Republic of Germany belongs to the responsibilities of the 16 states (Länder). Based on authorisation by law or agreements between the administrations, third parties too are involved in the settlement of these tasks. The states are co-operating with the Federal Agency of Cartography and Geodesy (BKG) and being supported by licensed surveyors as well as other administrative bodies at state or municipal level fulfilling the relevant staff requirements.

Survey and Cadastre Administrations of the States (Länder)

The majority of the survey and cadastre administrations of the states is assigned to the Departments of the Interior of the states and shows a three-stage organisational structure. Whereas the state survey offices are responsible for supply of medium scale geospatial datasets, the local cadastre offices have to perform the tasks of the real estate cadastre and to provide large scale geospatial basic information.

$ The range of services of the survey and cadastre administrations includes:

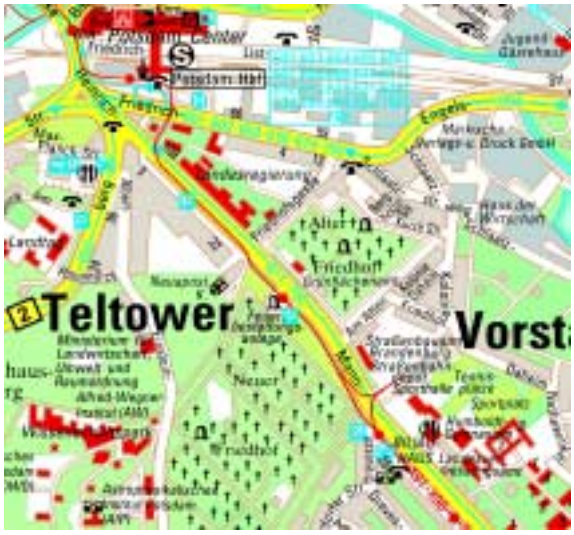
$ The permanently operating satellite positioning service - SA*POS*®

$ The geodetic control networks

$ The Authoritative Topographic-Cartographic Information System ATKIS®

$ The task of furnishing proof on ca. 62 millions of land parcels within the official real estate cadastre (e.g. Automated Real Estate Map - ALK, Automated Real Estate Register - ALB)

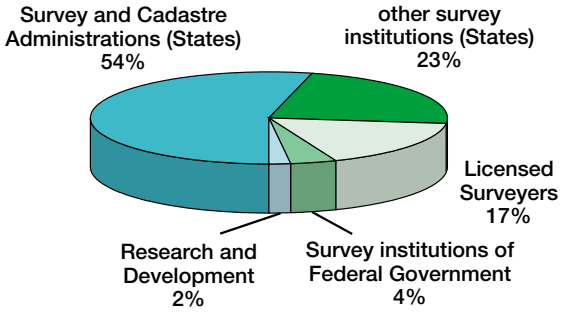
$ The topographical map series, aerial photography and thematic mapping.



The state survey offices are responsible for establishment and maintenance of the topographical map series.

On behalf of the states, the Federal Agency for Cartography and Geodesy (BKG) is producing the topographical maps at scales equal and smaller than 1:200 000.

The ca. 78 000 employees in surveying and mapping are allocated to the different responsible authorities and organisations as follows:



Contact addresses of the responsible authorities and organisations as well as further information can be retrieved from the following websites:
AdV (Working Committee of the Surveying Authorities of the States of the Federal Repulic of Germany) www.adv-online.de
ÖbVI (Association of Licensed Surveyors of Germany) www.bdvi.de
ArgeLandentwicklung (Bund-/Länder Task Force for Rural Development) www.landentwicklung.de
Research & Development, DGK (German Geodetic Commission) www.dgfi.badw.de

The relevant administrations of the states of the Federal Republic of Germany responsible for official surveying, and the Federal Ministries of Defense, of Transport and of the Interior have joined together in the Working Committee of the Surveying Authorities of the States of the Federal Republic of Germany (AdV) to work on matters of principle or of national importance. Permanent guests of AdV are the German Geodetic Commission (DGK), representing the universities, education and scientific surveying and the Bund/ Länder Task Force for Rural Development (ArgeLandentwicklung), responsible for land consolidation and rural development in Germany.

Responsibilities of AdV:

$ Elaboration of recommendations and binding regulations for a uniform approach to establishment, maintenance and further development of the geodetic basis, of the topographic survey, of ATKIS®, of the topographic map series and of the real estate cadastre

$ Joint carrying out of state-overlapping projects

$ Cooperation in development and application of new technical methods

$ Comments on draft bills

$ Discussion of questions related to organisation, staff, training, examination and discussion of issues concerning costs, licensing and use rights

$ Cooperation with relevant authorities and administrative bodies and institutions of geodetic science and education

$ Representing the interests of the official surveying and mapping in the European Union and in international institutions, and

$ International cooperation, also in the field of development aid.

Working Committee of the Surveying Authorities of the States of the Federal Republic of Germany (AdV)

P l e n u m	
Members: Baden-Württemberg, Bayern, Berlin, Brandenburg, Bremen, Hamburg, Hessen, Mecklenburg-Vorpommern, Niedersachsen, Nordrhein-Westfalen, Rheinland-Pfalz, Saarland, Sachsen, Sachsen-Anhalt, Schleswig-Holstein, Thüringen, Federal Ministry of the Interior, Federal Ministry of Defence and Federal Ministry of Transport, Building and Housing	
President	**Secretary General**

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Working Groups				
Matters of Principle	**Fundamental Geodetic Survey**	**Information and Communication-Technology**	**Real Estate Cadastre**	**Topography and Cartography**

2 Recent Work of AdV

Within the scope of the treatment of special problems of our profession and state-overlapping issues that need to be solved in a uniform way, the work of AdV has concentrated on the following topics in the period under review.

Matters of Principle

Related to the change of user requirements concerning official geospatial datasets, to the corollary in information and communication technologies and to the markets growing together, the AdV has been facing the challenge to tackle very different subjects such as the national and international cooperation, the provision of the necessary legal framework for an efficient geodata management and the adjustment of subject-specific education and training. Within the responsibility for dealing with education and examination questions, AdV has recently evaluated the introduction of the academic degrees "Bachelor of Science" and "Master of Science".

Situation up to now

Up to now, only the diploma courses of studies for surveying and mapping, as approved by the State Ministries of Education and the Arts, have been existing. Approval was only given, if a new course of studies corresponded to the relevant framework as adopted by the Standing Conference of the Ministers of Education (KMK) after consulting the AdV. AdV was involved by means of state-overlapping coordination according to § 9 of the general outline of the "Law for universities providing guidelines for specific elaboration (HRG)".

Innovations

According to § 19 HRG, the introduction of study courses leading to the academic degrees "Bachelor of Science" and "Master of Science is enabled. This was achieved by the Conference of the Vice-Chancellors of the German universities (HRK) in close cooperation with the KMK because of the better international comparability of graduations and in order to raise mobility of students. In general, these measures are supposed to increase the attractiveness of Germany as country for attending a university. At a first stage, the new study courses should be introduced on a trial basis besides the existing courses. A final decision will be made after completion of this test run.

The new courses of studies will have a modular structure and will, as regards content, be measured against an EU-wide uniform system of marks, which could be compared to the Anglo-American "credit-point"-system, that is measuring the various modules in quantity by points and in quality by marks. In case the courses of studies fulfil certain minimum requirements, they can be accredited by an accreditation agency. The issuing of accreditations is subject to systematic evaluation. The above agencies obtain the requirements as regards contents and formal procedures from an accreditation council assigned to the HRK. The accreditation aims at securing both transparency and standards of the offered courses of studies and therefore stands beside the state approval of the study courses for the time being.

Consequences

A direct impact of the introduction of the academic degrees "Bachelor of Science" and "Master of Science" on the service in the surveying and cadastre administration is not expected, because the preconditions for admission to traineeship for professional and

executive as well as graduate levels in civil service are so far only related to the academic degrees “Dipl.-Ing.” and “Dipl.-Ing. (FH)”. That is, why a claim of other applicants for admission to traineeship does not exist. Therefore, the traineeship can be continued unchanged in this respect.

However, it is already foreseeable that the accreditation procedures will probably form a substantial part of the procedures for state approval or even substitute them in the future.

Consequences could arise for the following reasons:

- certification of equal status of the courses of studies for “Bachelor of Science” and “Master of Science” with the diploma courses of studies and
- medium-term change of contents for the diploma courses of studies.

Next steps

AdV will strive for an involvement, at least in the elaboration of the minimum contents of a study course on surveying and mapping that would be necessary for accreditation - if need be through the Standing Conference of the Ministers and Senators of the Interior (IMK). AdV will point out to the KMK, that § 9 HRG requires state-overlapping cooperation. In addition, the aim of AdV is, to be represented by a delegate to the accreditation agency possibly to be founded which would be responsible for the course of studies “Surveying and Mapping”. There is no monopoly for foundation of accreditation agencies and there is no legal requirements as far as an involvement of the public sector is concerned.

Fundamental Surveying

The use of satellite-based positioning systems has been gaining a rapidly increasing importance for both the public and the private sector. A constant growth of the amount of users from sectors such as vehicle navigation on the water, across country or in the air or from traffic guidance systems, as well as increasing demands concerning accuracy, reliability and availability can be noticed. Further, new applications have continously been developed. The states have been taking this into account by forcing up the extension of the network of permanent reference stations for SA*POS*® and by streamlining relevant procedures and technical solutions. In addition, the states aim at uniform, customer-oriented regulations for users in order to tackle the economically beneficial concentration on one official geodetic reference system.

The Satellite Positioning Service of the German State Survey - SA*POS*®

The establishment of the Satellite Positioning Service SA*POS*® is making good progress. A network of multi-functional permanently operating GPS reference stations has been established in order to supply users and customers with data for differential GPS (DGPS) in standardised data formats for all possible applications. The positions of the SA*POS*® reference stations are determined with very high accuracy within the European Terrestrial Reference System 89 (ETRS 89). This means, that the users’ results from SA*POS*® are directly related to the uniform ETRS 89.

After the artificial decline of the GPS signals (selected availability), has been switch off, GPS is now providing an absolute accuracy of ca. 15 meters for non-military customers. With the service EPS (Real-Time Positioning Service) an accuracy of ca. 0.5 to 3 meters can be obtained, which is suitable for a multitude of applications. Correction data are broadcast in real-time. Two different services are available area-covering for Germany: In cooperation with German Telekom, the BKG provides the ALF-service (Accurate Positioning by Low Frequency). Further, the service RASANT (Radio Aided Satellite Navigation Technique) is available. Correction data are broadcast using

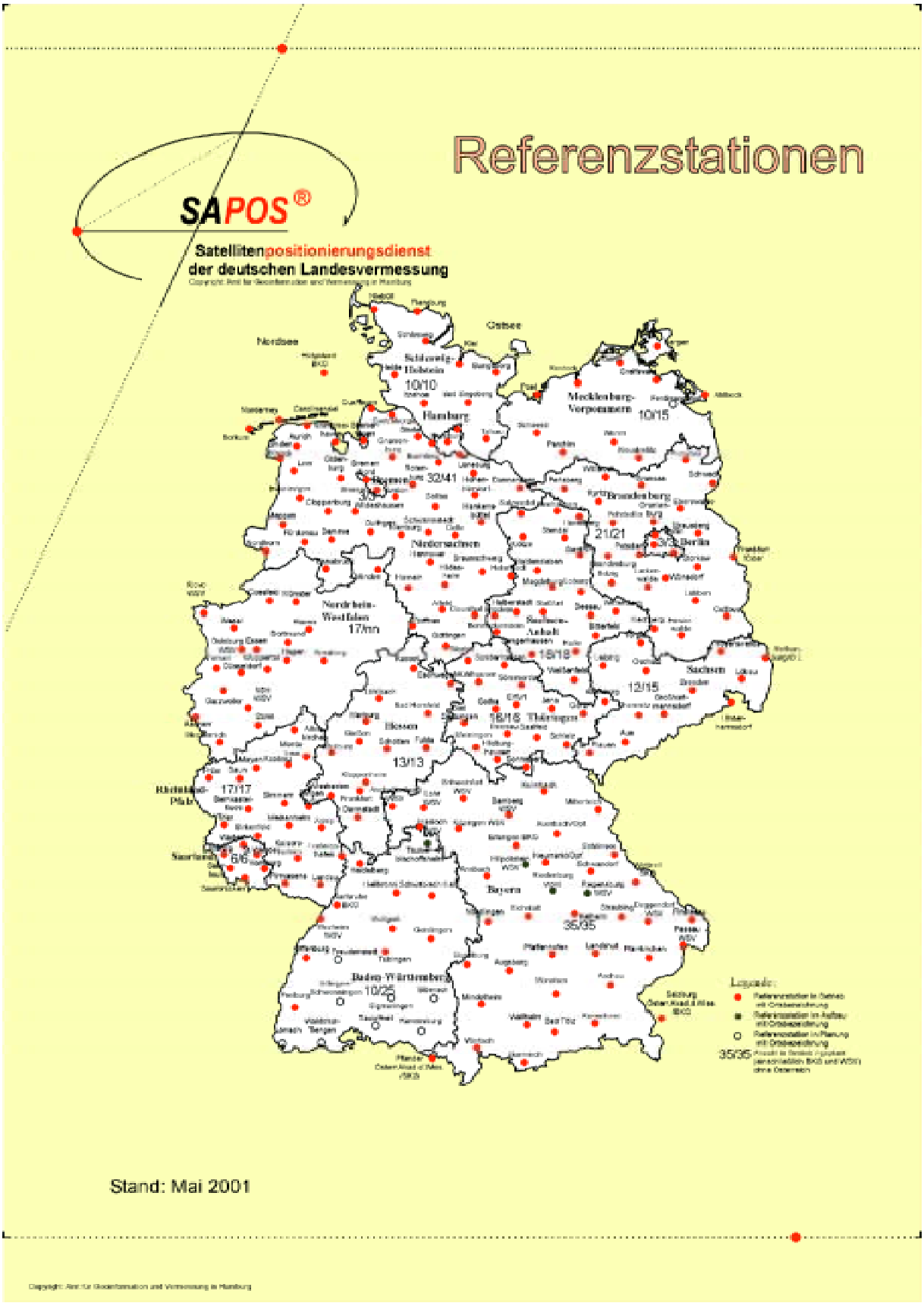

Illustration 1: Survey on reference stations in the Federal Republic of Germany

the Radio Data System (RDS) of the public VHF-radio transmitters.

The HEPS (High Precision Real-Time Positioning Service) offers an accuracy of ca. 1 to 5 cm and requires a network of GPS reference stations in distances of ca. 50 to 60 km. Correction data are broadcast via own 2m-band VHF-transmitters or can be accessed by mobile telephone. The network of reference stations is currently being extended. In most of the German states, the final stage has already been reached. At present, 85% of all planned reference stations (ca. 200 stations) are already working. In various states the online-linking of SA*POS*® reference stations is in progress. Location dependent correction data allow a real-time positioning with homogeneous accuracies of positions of ca. 2 cm at maximum reliability.

For the service GPPS (Geodetic Precision Positioning Service) with an accuracy of ca. 1 cm, customers have to use the data of the reference stations provided in the RINEX-format via telephone or Internet for a postprocessing or "near-online"-processing immediately after the field works.

The cooperation of delegates of AdV with providers of GPS hardware, software and communication technologies within the Technical Committee SA*POS*® has been continuing, to further improve standards and the future development of SA*POS*®.

Quasi-Geoid for Transformation of GPS-heights to DHHN 92

Since a couple of years, the survey administrations of the states and the BKG have been working on the realisation of a quasi-geoid by means of satellite geodesy and levelling that is going to allow the transformation of GPS-heights determined in ETRS 89 to heights of the German Main Levelling Network 1992 (DHHN 92) with cm-accuracy for the whole territory of Germany. This requires the determination of GPS coordinates (2x24 hours observation time) and normal heights through high precision levelling for more or less 800 points. The field works will be completed in 2001. The calculated quasi-geoid heights will then - together with ca. 150 000 point gravity data - be used for modelling a quasi-geoid. Calculations with various underlying mathematical models should be available in 2002. The tests already carried out show an accuracy of better than 1 cm for both plains and undulating terrain.

Applications

After the agreement on a cooperation contract of last year concerning the use of SA*POS*® reference stations for climatology research reasons and weather prediction and forecasts, AdV has received further enquiries for similar use of SA*POS*® data in the field of disaster prevention.

Real Estate Cadastre

With carefully targeted resolutions AdV has defined a uniform approach to the standards of a future-oriented real estate cadastre and the related administrational procedures. This will give geospatial basic datasets their appropriate status and allow the full use of the value-added potential included in the data of the real estate cadastre.

Satellite-based Surveying Methods

The use of satellite-based surveying techniques opens up new perspectives for the link of real estate surveys to the official reference system, for the design of trigonometric control networks and for renewal of the numerical data of the real estate cadastre. The choice of a special surveying method is, of course, dependent on the purpose of the field works, economic aspects and the facts of each surveying project, as they are. The fundamental decisions on the use of satellite-based methods are currently being converted into the respective state laws.

Buildings

Buildings are considered to be substantial parts of land parcels and are therefore real estate according to the spirit and definitions of the cadastre laws. Data on

Illustration 2: Use of the real estate cadastre as basic information source for specialised applications

buildings must be captured with unambigous spatial reference and must be kept complete and current at any time. As far as external bodies can provide appropriate datasets on buildings, these data should be used for keeping current the relevant files of the real estate cadastre. The decision, whether external data should be used, is made by the relevant cadastral offices.

Land Use

It is a legal task assigned to the cadastral offices, to describe and depict the current land use area covering and to provide that information to customers. This task has special importance because of the expectations of society, economy and administration with regard to the task of the official surveying and mapping to provide integrated geospatial data for the states (Länder).

Maintenance of Real Estate Cadastre

In order to guarantee a uniform spatial reference for all data maintained in the real estate cadastre, AdV has decided on the introduction of ETRS 89 with the UTM grid system as official reference system for the states (Länder). This requires a calculation of the real estate cadastre coordinates in ETRS 89 and UTM as soon as possible. The necessary framework was adopted in May 2001 by all survey administrations. Boundary coordinates, as well as selected buildings are to be determined and stored with high accuracy and reliability, other objects will be stored with customer-oriented accuracy and reliability. Due to limited budgets and staff resources, the aim “Coordinate Cadastre” will only be reached stage-wise in combination with the ongoing works for conversion of the paper real estate cadastre to digital form and for integration of the numerical and graphical parts of the cadastre.

Use of the Real Estate Cadastre

The real estate cadastre, the way it sees itself, is a public information system providing detailed data on all land parcels and real estate. In principle, cadastre data are available for everybody without any preconditions. The real estate cadastre will be consequently extended in order to serve this purpose. An alignment of the scope of services and data with recent customer interests, based on a new legal and administrative framework, is on the way.

Topography and Cartography

Within the period under review, the survey administrations have been facing additional challenges caused by the necessary increase in data currency and other customer demands as far as geospatial basic data are concerned. The extension of the geodata centre run by BKG as well as the progress that has been made with the geodata portals of the states (Länder), has enabled the supply of a broader range of users with geodata and relevant metadata. However, a vivid exchange of ideas on the extended conditions for supply and use of geodata is still ongoing. First steps for improvement of the currency of our geodata have been initiated.

Digital Elevation Model for Germany (DEM)

Whereas the German states provide efficient DEM with meter- and submeter-accuracies, a complete, homogeneous DEM with medium accuracy has not been existing for the territory of Germany up to now. On the other hand, public, civilian and military institutions as well as private companies emphasise their strong demand for such data. Typical applications are the three-dimensional navigation and visualisation, the management of mobile communication networks or the completion of the ATKIS® landscape models. Currently, the state survey administrations of Germany, with BKG being in overall charge, are preparing the establishment of a DEM for Germany showing a height accuracy of 1 to 3 meters. It will mainly be derived from mathematical merging of the already existing DEM of the states.

Currency of Topographic Geodata

Also in Germany it was realised, that a change in paradigms has been taking place as far as the understanding of the term "currency of geodata" is concerned. Users do no longer accept updating cycles of a couple of years. To meet those demands requires a complete change in thinking for the state survey administrations and to redefine the hierarchy of tasks. Consequently, concepts and strategies are currently being elaborated by AdV, to reach an overall data currency of less than one year by means of portable field computers, improved exchange of existing data on changes and computer-aided evaluation of aerial photography.

The Product Line ATKIS®

The establishment of the various products of ATKIS® (ill. 3) is still one of the core tasks of the German state

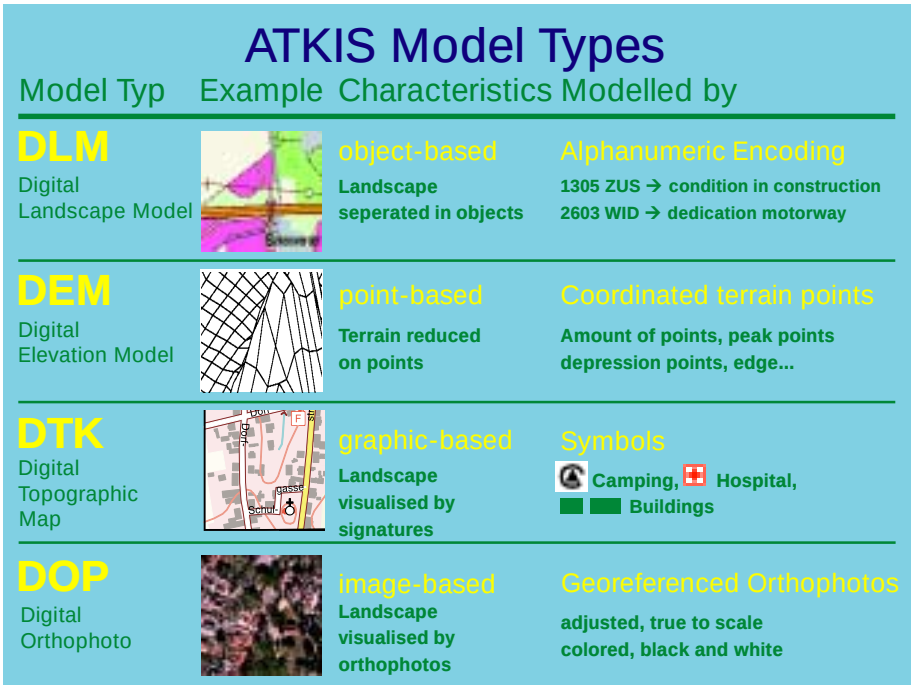

Illustration 3: The multi-functional description of the earth's surface of the Authoritative Topographic-Cartographic Information System ATKIS® is expressed by the product characteristics of this product

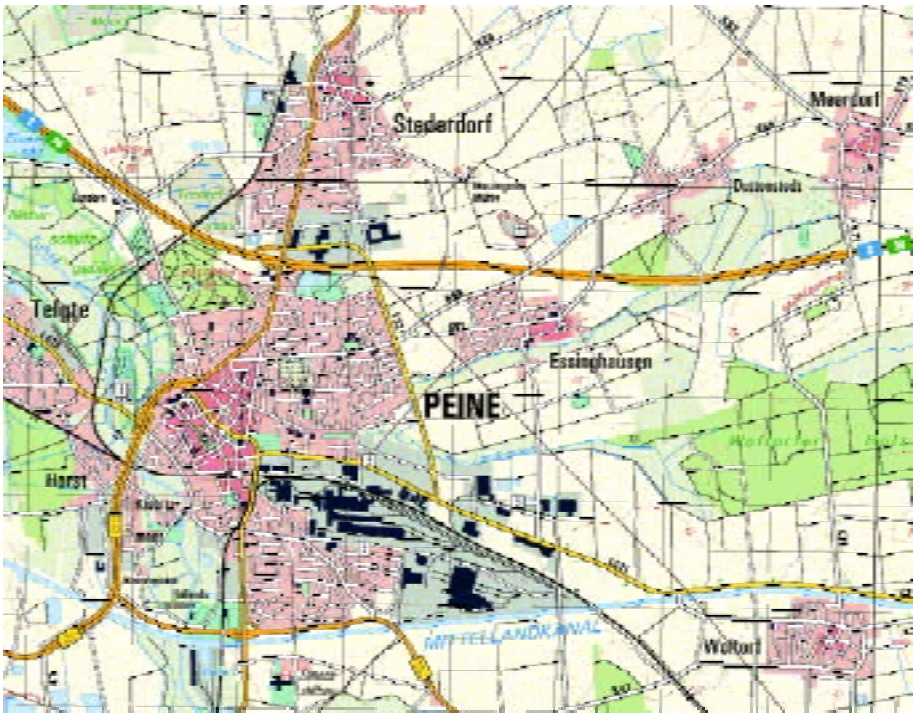

Illustration 4: Clipping of the map graphics of the new Digital Topographic Map 1:50 000, that will be part of the product line ATKIS®

survey. As the third and last stage of realisation of the ATKIS® basic landscape model (Basic-DLM) will probably start by the end of 2001, AdV has once again adjusted the relevant catalogues to the recent needs of economy and public administration. In addition, the object catalogues of the Authoritative Real Estate Cadastre Information System ALKIS® and of ATKIS® were harmonised in a way, that allows the easy data exchange between both systems. This also applies for the Authoritative Control Point Information System AFIS. All three systems are based on a common uniform data model.

The decision on AdV-standards for the cartographic layout of the new topographic maps 1:10 000 and 1:25 000 that was made in 1999, has allowed, to agree on the new graphics for the Topographic Map 1:50 000 now (ill. 4). It's main characteristics is the depiction of built-up areas without showing the single buildings and the density of development. Further, AdV has decided on the project "ATKIS® - model generalisation and cartographic generalisation" for solving the technical problem of generating the topographic map 1:50 000 as ATKIS®-DTM50 from the Basic-DLM.

DLM/DTM 250 and 1000

The DLM250 (scale 1:250 000) is available in its first version covering the whole territory of Germany. The improvement of the DLM250 and especially the updating process for DLM250 data is in progress. A corresponding DEM250 with a grid-width of 200 m was established as well.

The DLM1000, as well as the corresponding DEM 1000, are available covering the whole area of Germany. Only updating works and the improvement of data density are currently being carried out.

Illustration 5: The CD-ROM Top50, version 3.0, with 3D-practicalities has successfully been established on the market as a product of the German state survey

A preliminary updated version of the Digital Topographic Map 1:1 000 000 (DTM1000) is available in two graphical resolutions, different projections, spatial structuring and data formats.

On behalf of the states, BKG has started the necessary preparations for production of the DTM250 and DTM1000 and already demonstrated first results concerning presentation of the products DLM250 and DLM1000 during the exhibition INTERGEO 2000. It is planned to develop relevant map specimens for DTK250 and DTK1000 until October 2001, in order to present them in 2002 for approval.

Topographic Maps on CD-ROM

The CD-ROM series, which is edited by the states (Länder) and the BKG for the whole territory of Germany and which is presenting raster data of the topographic maps 1:50 000 and 1:200 000 in a software-aided way under the trademarks "Top50" and "Top200", have very successfully established themselves on the market. Features of the version that is currently being produced are some extended practicalities, especially the depiction of the third dimension (ill. 5).

Quality Management and Certification

The geospatial datasets of the survey administrations are representing an investment of several hundred millions of German marks. Substantial financial means have been invested by customers who purchased geospatial basic data and use them. Besides their financial value, geospatial basic data have been forming the backbone of many safety relevant civilian and military applications. These aspects alone require the description, securing and proof of quality features of geodata with regard to their suitability for a number of defined applications. This is the reason, why standardised quality elements have been introduced to the ATKIS® data model. AdV is still striving for a quality profile covering the whole ATKIS® product line and is fostering the awareness for the necessity of a quality management.

Copyright and Sales

The states and the BKG have been further extending the geodata centre at BKG, in order to be able to distribute geospatial basic data state-overlapping and for the complete area of Germany. This has been coming along with the introduction of a metainformation system, that is being supplied with relevant metadata directly by the states. One basis for this system certainly is an overall revision of terms aiming at a harmonisation and a standardisation suitable for the market. In this context, AdV is also dealing with methods for securing datasets from piracy and abuse. The results of a study on this subject, which was conducted by the Fraunhofer-Institute for Computer Graphics (IGD) are available.

Illustration 6: Common stand of AdV informing on geospatial data of the German state survey at fairs and exhibitions

Pricing and fees for use of official geospatial data and maps are still subject to discussions. Whereas public users vote for a data supply free of charge to a large degree, industry and economy aim at substantial price reductions. Consequently, AdV is working hard on an amendment and technical update of the existing fees and charges guidelines.

Geodata Portals

Whereas private enterprises have been offering their geodata via so-called Internet-Shops for a long time, also public institutions now are going to open their geodata potentials and to offer them via "geodata portals" or "geodata servers". With their geospatial basic data, the state survey administrations and BKG are making a major contribution to this development. Examples can be found in www.adv-online.de and the included links to the webpages of the state survey administrations and BKG.

Public Relations Work, Fairs and Exhibitions

The German state survey, represented by AdV, is taking part in important fairs and congresses on a regular basis. AdV is running an exhibition stand and is moreover proactively involved in presentations and panel discussions (ill. 6). Most successful are especially the annual events "INTERGEO" as central fair for surveying and mapping, which takes place every year in another city, and the Frankfurt Book Fair.

In line with the responsibility of the states (Länder) for the official mapping and geospatial data, the state survey offices of the states are running their own media for public relations work and advertising. This first of all includes printings and webpages. In addition, AdV has it's own webpage (www.adv-online.de) which is linked to the startpages of all state survey offices of Germany.

Job Outline of the Profession Cartographer

Owing to the development of electronic media and methods, the legally defined training for the occupation "cartographer", which has a long tradition in Germany, is facing a serious re-structuring. In order to meet those new demands, a new training ordinance was adopted and the different training facilities were provided with appropriate equipment (ill. 7). However, a significant decrease in the number of trainees could be observed. Currently, AdV is working on plans to adjust the job outline for the profession "cartographer" to the constantly changing situation in production and on the labour market. This includes the observation of new, related jobs, such as the "media designer for digital and print media".

Illustration 7: Interactive cartographic screen as central teaching aid for the profession "cartographer"

GIS and Geodata at School

Various initiatives, such as the "International GIS-Day", an appeal of the "German Umbrella Organisation for Geoinformation (DDGI)" or relevant plans of the ministries of education and the arts have raised endeavours in Germany, to use geodata and GI software for teaching geography at school. Well-known enterprises as well as educational publishing companies have developed special software for teachers, schoolchildren and students. The overall goal is, to use topographic geospatial basic data not only for geography but for other subjects such as social sciences as well. Further, a section within the frame of the youth supporting project "Youth is researching (Jugend forscht)" will probably be founded. Both publishers and private companies are looking for a coope-

ration with the state survey administrations. It is expected, that all partners involved will benefit for their products.

ATKIS® - Model Generalisation and Cartographic Generalisation

With the ATKIS® Basic-DLM, the German state survey has an outstanding potential of object-oriented topographic geospatial basic data at it's disposal. One of the most urgent tasks is, to derive the future digital topographic maps from these data in a graphic manner suited to the media. The complex and integrated processes of cartographic generalisation still are the core problem. In order to realise a nationwide solution, AdV is preparing the R&D-project "ATKIS® - model generalisation and cartographic generalisation".

All partners consider the project to be of utmost importance and desirable.There is no doubt about the fact, that the project is of high scientific and production-oriented value and a substantial budget will be needed. The AdV will accompany the project with regard to professional aspects, aspects of data processing and organisational aspects. At present, it turns out, that a stagewise solution, including two different stages (one on top of the other), could have very good chances to be realised.

Information- and Communication Technology (IT)

Information- and communication technology forms the technical interface between the works of the fundamental surveying, real estate cadastre and topography and cartography. Within the period under review, the activities of AdV were focussed on the IT-works for modelling of the geoinformation of the official surveying and mapping, as needed for further development of the AFIS-ALKIS®-ATKIS® concept. Especially the task force "Data Model/Data Exchange" was responsible for updating the AFIS-ALKIS®-ATKIS® data model, for conversion of parts of CEN-standards to parts of ISO-standards for the already available parts of the documentation and for elaboration of quality criteria for the AFIS-ALKIS®-ATKIS® basic scheme.

Conversion of the Drafted Models from CEN- to ISO-Standards

In order to describe the application schemes and object catalogues, AdV has decided to make use of the data modelling language UML (Unified Modelling Language), which is also applied by ISO for standardisation of geoinformation. It is defined in the ISO-standard 19103 "Conceptual schema language".

Within the period under review, the UML-packages for the conceptual and the external basic scheme and for the data catalogues were drafted as basis for the UML-conversion of the specific schemes and the object catalogues.

Data Exchange Format

The works for definition of a uniform data exchange format have been ongoing. Decisions on the stages in data exchange and for unique identification of objects have been made.The data description language XML (Extended Markup Language) is being used as universal and system independent data exchange and file format according to ISO-standard 19118 "Encoding".

The XML-schemes for the external basic scheme, as basis for the subject specific XML-schemes AFIS, ALKIS® and ATKIS®, are defined.

Quality Control System

The quality control system as it was decided by AdV for the geospatial data of the official surveying and mapping, comprises inter alia a check on conformity with the AdV-standards. Based on the ISO-standard 19105 "Conformance and Testing", requirements that are used for such scrutinies, were formulated. The scrutiny has not yet been finalised.

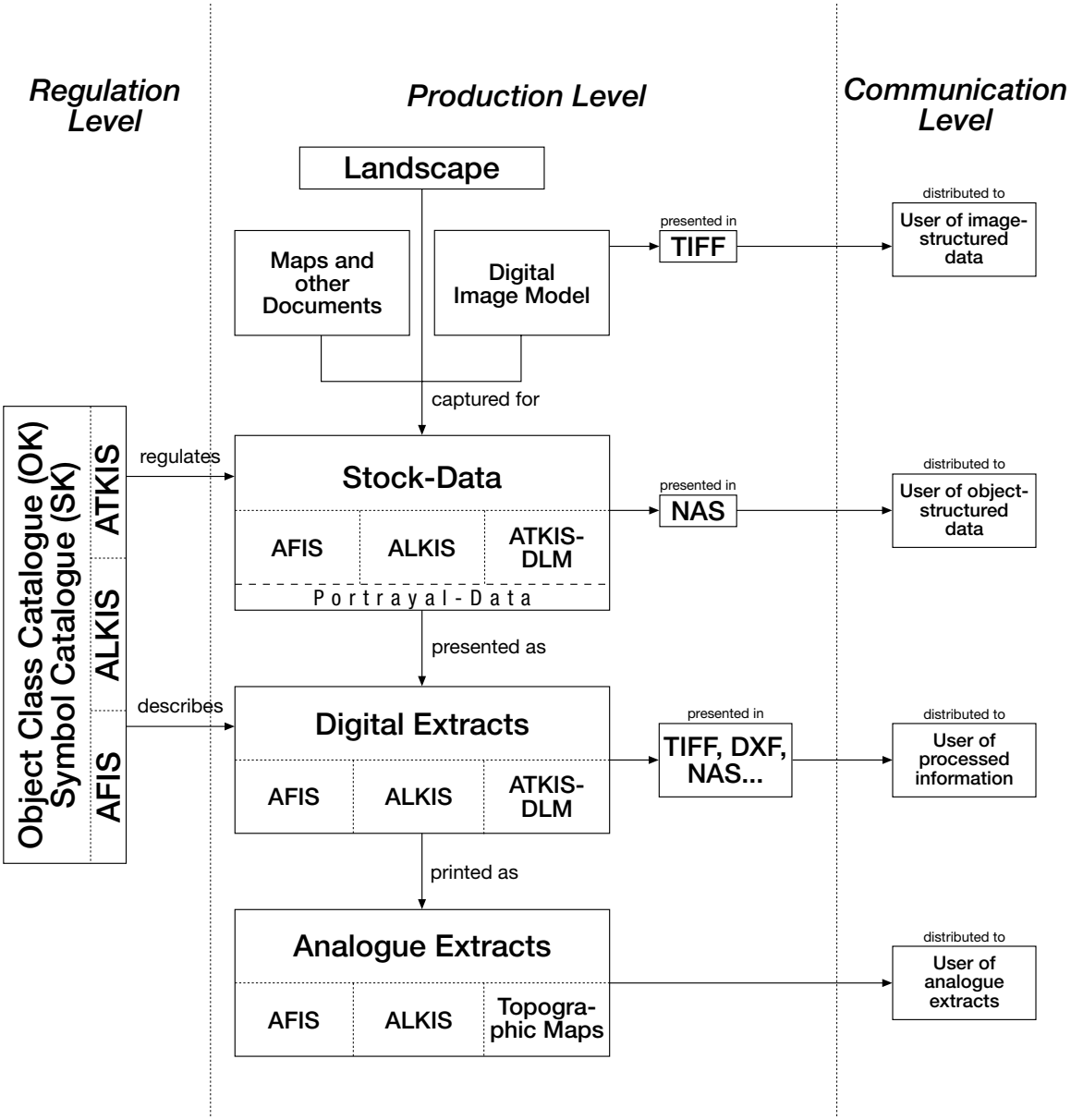

Illustration 8: Common AFIS-ALKIS®-ATKIS® Reference Model

Exchange of Information with GIS Producers

The conceptional works have always considered the requirements of information- and communication technology for implementation. This is, why the results of the works have been coordinated with GIS producers on a regular basis prior to any decision, be it during Workshops or in AdV-Working Groups.

Documentation of the Results

The finalised parts of the concept are each time described without delay and are added to the "Documentation on Modelling of the Geoinformation of the Official Surveying and Mapping (GeoInfoDok)".

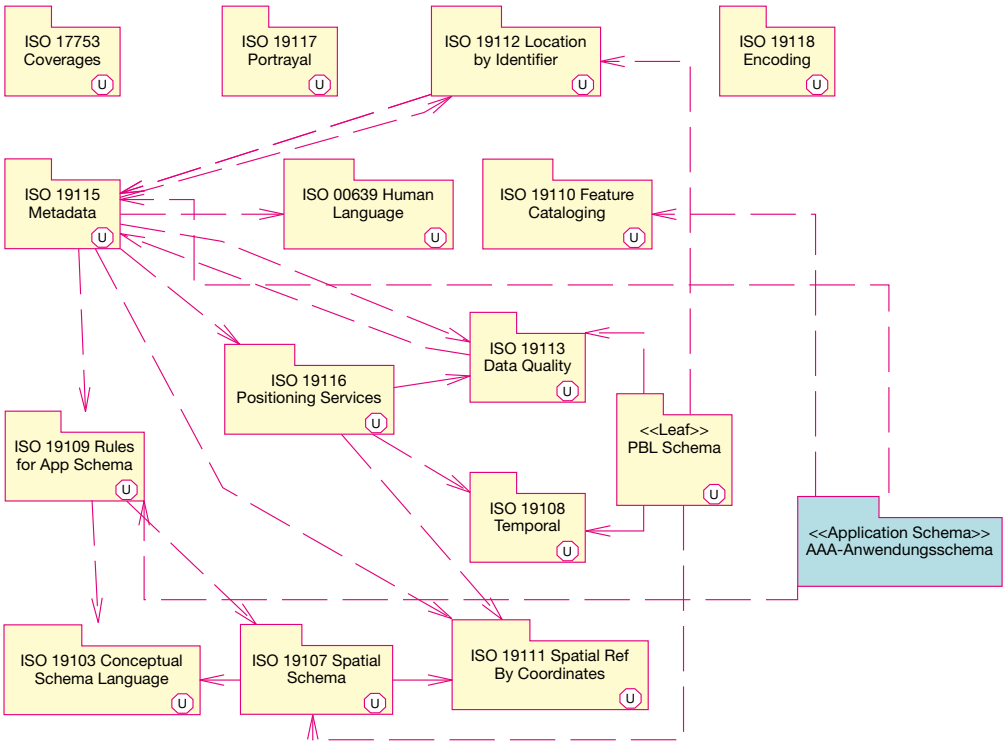

Illustration 9: Common AFIS-ALKIS®-ATKIS® application scheme in context with the standardised structures (packages from ISO 19 100 “Geographic Information”)

3 National and International Cooperation

The official surveying and mapping of Germany is represented in national and international committees for working on inter-disciplinary and international tasks. Related to the respective task, either delegates from the Federal authorities or from the state (Länder) authorities will join the work or attend relevant meetings on behalf of AdV.

The IAG Subcommission for Europe was asked to define a European vertical reference system based on the European levelling projects “United European Levelling Network (UELN) and “European Vertical Reference Network (EUVN)”. In this context, and taking into account the possibilities of the various countries, BKG has prepared the relevant documentation which was adopted by EUREF. The heights database for the European projects UELN, EUVN and European Vertical Systems (EVS), being maintained by BKG, has been further extended. After the successful integration of the Baltic states (ill. 10), Bulgaria will probably join in 2001.

The European Permanent GPS Network (EPN), including ca. 120 stations, is being maintained in order to realise a uniform geodetic spatial reference within the framework of EUREF. BKG has established a data centre, where the relevant data for Germany are added to the weekly updates of the continental overall solution. The resulting coordinates, which serve for maintenance of the International Terrestrial Reference System (ITRS) and for estimation of relevant parameters for earth rotation, are, inter alia, given to the International GPS Service (IGS). BKG is processing the GLONASS-data captured in EPN, together with additional data from the International GLONASS Ser-

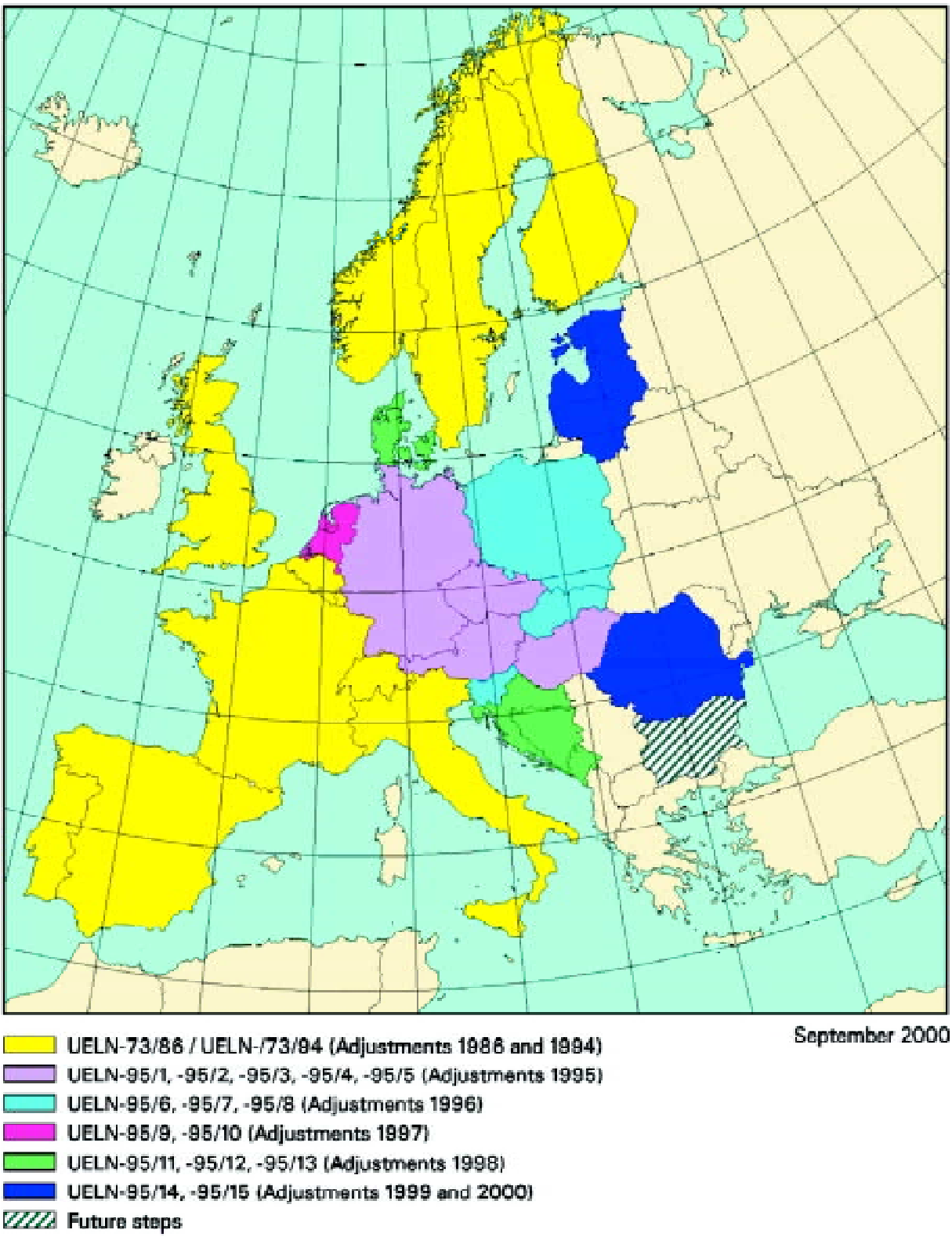

Illustration 10: Steps for renewal and extension of the UELN-dataset

vice Pilot Project (IGLOS), to determine precise satellite orbits for the satellites of the Russian GLONASS system on a weekly basis.

By running the fundamental station Wettzell of BKG and by constructing and providing the Mobile Integrated Geodetic Observatory (TIGO) for improvement of distribution of the International Space Geodetic Network (ISGN)-stations on the southern hemisphere (Chile), Germany is substantially contributing to the realisation of the global spatial reference systems ITRS and ICRS. Updating of these systems is being carried out by international cooperation within the scope of

the services of the International Association for Geodesy (IAG) and the International Astronomical Union (IAU). With the BKG, Germany is moreover involved in other services and projects (VLBI, SLR, IVS, ILRS, IGS) and is further responsible for maintenance of the central bureau of the International Earth Rotation Service (IERS).

Coming along with the political and economical unification of Europe, gravity data, that had been classified as secret, are freely available now in Central and Eastern Europe. The BKG is contributing the official geospatial data of the Federal Republic of Germany to a common gravimetric project for Central and Eastern Europe (UNIGRACE) and has, in addition, taken over the project management.

Permanent Committee on Geographic Names (StAGN)

Central task of the Permanent Committee on Geographic Names (StAGN) is the standardisation of the official and private use of geographic names for the German-speaking area. Members of StAGN are Germany, Austria, Switzerland and other German-speaking regions. They are representing the fields of cartography, topography, geography and linguistics from science, administration and practice. The administrative office is located at the Federal Agency for Cartography and Geodesy (BKG).

The Permanent Committee has held altogether three meetings since January 2000. One important topic was the impact of the reform of German spelling on the spelling of geographic names. The plenum of AdV has decided, to follow the recommendations of StAGN how to apply the new way of spelling to geographic names. Another central issue of the consultations was the preparatory work for the 8th Conference of the United Nations on Standardisation of Geographic Names in 2002, which will be held in Berlin, Germany, on invitation of the Federal Government. This included the 2nd International Symposium on Geographic Names “GeoNamen 2000” hosted by BKG in March 2000, which could welcome 77 participants from 25 countries. During this event, it was demonstrated in the Hessian Broadcast, how the pronunciation database of the ARD (German television) for pronunciation of geographic names is working.

EuroGeographics

On 01 January 2001, EuroGeographics was established from the merger of the former European organisations CERCO and MEGRIN.

Currently, EuroGeographics has the same aims and tasks as the predecessor organisations, but it is expected, that these tasks will be performed in a more efficient way than before. To reach the main goals - better establishment and handling of geospatial information - it is necessary to cooperate with other providers and users of such data.

The principal tasks of EuroGeographics are:

- to make a decisive contribution to the development of geospatial information in Europe (first of all to integrated databases of all European National Mapping Agencies and to a general access to data)
- to influence the decision making of the European Commission as far as the development of new methods for geoinformation is concerned
- to support the introduction and application of integrated GIS in and beyond Europe
- to support the capture of necessary information which is currently not available for customers
- to arrange bilateral or multilateral cooperation amongst members of EuroGeographics and to facilitate cooperation of members and their European partners, including those from the private sector.

The official surveying and mapping of the Federal Republic of Germany at the General Assembly of EuroGeographics is represented through an AdV-delegation under the leadership of the President of the Federal Agency for Cartography and Geodesy (BKG). He is in addition a member of the EuroGeographics Management Board. Topics that touch the interests of the states (Länder) and the preparation of resolutions of the General Assembly are to be agreed amongst the delegation.

EuroGeographics has been continuing the establishment of a homogeneous, seamless dataset of the European administrative boundaries (Seamless Administrative Boundaries of Europe, SABE) composed of the official sources of the member states. BKG has taken over the responsibilities as project coordinator, project manager and production center for SABE. In spring 2001, a revised version of the SABE97 versi-

on, which includes new data formats, product types and additional European countries, was delivered. The next version will reflect the administrative boundaries at the qualifying date of the European census procedures (in most of the countries the 01 January 2001).

The EuroRegionalMap (ERM) as a topographic basic information system to a scale of 1:250 000 is being established under the leadership of IGN Belgium. Germany is represented in this project by BKG. A task force has already worked on a model specification. Contents and suitability of the data model will now be elaborated and demonstrated on a prototype.

Another project of EuroGeographics is EuroGlobalMap (EGM), which is a topographic dataset with a resolution of 1:1 000 000. EGM is being established on the basis of the project MapBSR (Map of the Baltic Sea Region). With very few exceptions, all countries of Europe have agreed on a collaboration. BKG is participating for Germany in the Technical Committee, which already has developed technical details of the EGM specification. In addition, BKG has taken over the role of a regional coordinator for the area of the Netherlands, Belgium, Germany, Austria, Czech Republic, Slovenia and Croatia. A subset of this dataset will form the European contribution to GlobalMap, a worldwide topgraphic dataset to a scale of 1:1 000 000.

The demand for Europe-wide information on roads and services has constantly been increasing (Road Data & Services). EuroGeographics will undertake an initiative in order to promote and coordinate cooperation in this field. BKG will participate to provide topographic basic data for Germany.

Standardisation

For the first time, the survey administrations of Germany are making use of international standards for development of the new ALKIS® and ATKIS® data models. With the consideration of these standards and the system-independent modelling, a long-term investment security for the conversion to the new data structures has been given to administrations and users. This allows to run ALKIS® with standard software and database products and reduces costs for procurement and maintenance of these systems substantially.

The International Standardization Organization (ISO) is dealing with standardisation of geoinformation systems and their application at an international level. For Europe, the European standardisation organisation CEN (Comite Europeen de Normalisation) has elaborated comparable standards that were used as basis for ISO. The standards developed by CEN have only reached the status of a “pre-standard” and will probably not reach a further stage. The adoption of ISO-standards as European standards is currently being prepared. This will give ISO-standards a compuslory nature, also in European countries. The most important ISO-standards for geoinformation are expected to be completed by the middle of the year 2002.

In Germany, the German Institute for Standardisation (Deutsches Institut für Normung, DIN) has been working on standardisation in the field of geoinformation. DIN is an official member of ISO and has proactively been supporting the works of the relevant technical committee of ISO (ISO/TC 211). DIN converts international to national standards and makes them obligatory for Germany this way. The AdV has been strongly supporting these activities by secondment of staff and financial contributions.

The data models of ALKIS® and ATKIS® apply ISO-standards, especially for definition of the data exchange format, description of geometric and topologic structures and for description of metadata and quality aspects of geospatial data. The efforts of the survey administrations to integrate international standards in order to establish planning security for the customers, are also underligned by the fact, that ALKIS® was selected as testbed by ISO/TC 211. ALKIS® is one of the first application schemes making consequent use of ISO draft standards. The aim of the testbed is to accompany the future development of the ISO group of standards until they will be completed. Besides the desirable feedback for ISO derived from practical application, the modelling of ALKIS® should also be subject to scrutiny. The above activities do not only raise the user acceptance of standards, but also acceptance of ALKIS® itself amongst GIS producers.

Besides the official (de jure) standardisation organisations, the GIS industry itself is dealing with standardisation of geographic information systems. In contrast to the more conceptional approach of ISO, the GIS industry is trusting in ready-to-use and economic solutions. The de facto implementation of standards is given priority. All well-known GIS companies world-

wide have joined the OpenGIS Consortium (OGC), aiming at the realisation of a system-overlapping interchangeability of geodata (inter-operability). OGC does only develop those standards, that have every prospect for economic success. At the same time, a cooperation agreement of OGC and ISO does guarantee, that industry developed standards are in accordance with official standards and that, vice versa, ISO developed concepts have a good chance to be realised by the industry. At present, it is being considered by AdV, to take into account the relevant OGC specifications as well, as far as the data exchange format is concerned.

Permanent Inter-Departmental Committee for Geoinformation (IMAGI)

The IMAGI, which was founded in June 1998, has been continuing it's works with a stocktaking of the existing geospatial data and metainformation systems being used in Federal administration. This has provided the sound basis for establishment of an efficient geodata management concept at Federal level.

In order to reduce the considerable need for information also within the political sector, the IMAGI and AdV have carried out an information event for members of the German parliament (Bundestag) on the premises of the German Parliament. This event took place prior to the parliamentary debate on the Parliamentary Question of the CDU/CSU-group concerning geospatial information in Germany in January 2001.

The representatives visiting the event put their emphasis on the interactive GIS-applications that were demonstrated and on in-depth discussions (ill. 11). Particular interest was given to the guarantee of the provision of uniform and homogeneous geospatial basic data by the states (Länder). By adopting the attached resolution proposal, the members of parliament have underligned their awareness of the importance of official geospatial basic datasets.

The impact of the many discussions with the parliamentary representatives on the further development of the national geospatial data infrastructure is estimated to be very strong.

Illustration 11: Information Event for Members of Parliament (Bundestag)

Attachment

German Bundestag

Printed Paper 14/5323

14th Electoral Term

14/02/2001

Use of geoinformation in the Federal Republic of Germany

The German Bundestag establishes as follows:

Acquisition, processing, distribution and use of geoinformation constitute a central element in the modern information society.

Germany holds an international top position as to the quality and status of its geodata, which are compiled under the responsibility of the Länder and provided by the Federal Government and the Länder. However, in this position Germany faces fierce competition, due to the dynamically developing information technologies and marketing structures.

From the application possibilities offered by geoinformation to economy, administration and science, which have effects on almost all segments of society, arise important markets with far above-averagegrowth rates and new qualified workplaces. Through the use of multimedia information technology, geodata play a key role in all areas where planning and administrative decisions need to be simpler, better comprehensible and more transparent.

Moreover, geoinformation is an indispensable help in the decision-finding process and serves also as a working aid, e.g., with regard to measures for the protection of natural resources, the precautionary consumer protection and a sustainable land use management.

Therefore, the Federation, the Länder and private initiative are called upon to make sustainable use of the chances and possibilties inherent to geoinformation and the geosciences on the basis of trusting and close cooperation, while aiming at their further development.

These chances are set out in detail in the cabinet decision of 17 June 1998 and in the answer of the Federal Government to the major interpellation on the "Use of geoinformation in the Federal Republic of Germany" - Bundestag printed paper 14/4139. In addition, there exists the big chance of according geoinformation its due place within the framework of the "Year of Geoscience" in 2002.

1. The German Bundestag welcomes the fact that the Federal Government has considerably promoted coordination in this field by the establishment of the Interministerial Committee for Geoinformation (IMAGI). IMAGI has elaborated the "concept of an efficient geodata management by the Federation" and is currently occupied with its implementation. It would be desirable that this initiative of the Federal Government be not restricted to federal agencies, but that it will also contribute to strengthen geoinformation as a whole and also at the Länder level.

2. The German Bundestag wants to achieve that the strongly growing importance of geoinformation for the modernization of economy, science, administration and politics is perceived more clearly by the public attention, and that its value-adding potential is better acknowledged. A vigorous strategy by the Federal Government and the Länder will be needed to ensure improved pooling, uniform maintenance as well as a fully centralized distribution of basic geodata that are provided by the Federation and the Länder.

3. The aquisition of basic data of geoinformation is, and will also in future, be financed mainly through public funds. They constitute a public infrastructure by which alone a continuous and area-wide supply with up-to-date and reliable data of consistent quality can be guaranteed.

   In line with the Green Book of the EC entitled "On the Information of the Public Sector in the Information Society" and the drafts of the "Law on Free Access to Information", this national geodata-infrastructure is already available to all public services and facilities as well as to the private and business sectors.

   The further development of the geodata-infrastruc-

ture requires even more sustainable investments, last but not least to maintain Germanys leading role,. A supporting measure in this direction is the adoption of the research programme "Geotechnologies" by the Federal Government. Beyond that, the Federal Government is asked to

- strengthen, on the one hand, its efforts to support particularly the application-oriented research and development of geoinformation, and also to support the further advancement of a national geodata infrastructure, and
- on the other hand, to place more emphasis on and to vigorously support applications relevant to existing and new enterprises, specifically smaller and medium-sized undertakings, e.g., in the transport, agrarian, environmental, town, country and regional planning and development sectors. Here, first of all measures are to be supported which aim at facilitating the access to official geodata stocks.

4. The German Bundestag assumes that the Federal Government will continue to create the preconditions for a broad and steady use of the specialized data registered and maintained by the federal administration. Besides, the geodata acquired and kept by the Länder should also be included on a basis of mutual interest. The concept developed within IMAGI for the purpose of an efficient geodata management by the Federation should be implemented as quickly as possible.

5. Efforts should be taken to increase the user-friendliness of official geodata and to significantly facilitate access to them. To this effect, the responsible bodies and institutions of the Länder and the Federation are continuously requested to make rapid progress in the further development of a modern geodata management within their range of responsibility, meeting present-day requirements. Particularly it should be ensured that knowledge about the value and use of geoinformation, especially with regard to efficient administrative action within a modern administration, can be considerably and generally improved by means of informative measures and profound educational work. Still existing deficits with regard to the aim of a future-oriented use of geoinformation by governments, industry, and science are to be further reduced systematically.

6. The Federal Government is asked to review the compatibility of uniform geodata maintenance and processing at the federal level within the framework of international and European initiatives, with the common aim of setting up a global or European geodata-infrastructure, for example, based on the model of the USA (FOI).

7. The Federal Government is called upon to safeguard and consolidate the international top position held by Germany in the fields of geodesy and geoinformation. Within this framework, a competent representation of the Federal Republic also on the European and international levels is required. In this context the German Bundestag asks the Federal Government to see to it that German interests are promoted in the European and international areas in a way that has been agreed with the Länder, to take also political advantage of the existing German lead, and to accelerate the adoption of the concepts of the Information Society Technologies (IST) of the EC.

8. With a view to a sustainable development of the rural and urban spaces in Germany, the Federal Government is called upon to speed up the application of efficient technologies and at the same time make consistent use of geoinformation in all spheres of society and fields of application, as, for example, nature and environmental protection, nature-compatible and environmentally friendly agriculture and forestry, precautionary consumer protection, transportation or urban and regional planning.

9. The Federal Government is called upon to submit to the Bundestag a progress

   report on the status of development in the different fields and sectors of geoinformation in the national, European and international context in the course of each third year of a legislative period.

Berlin, 14 February 2001