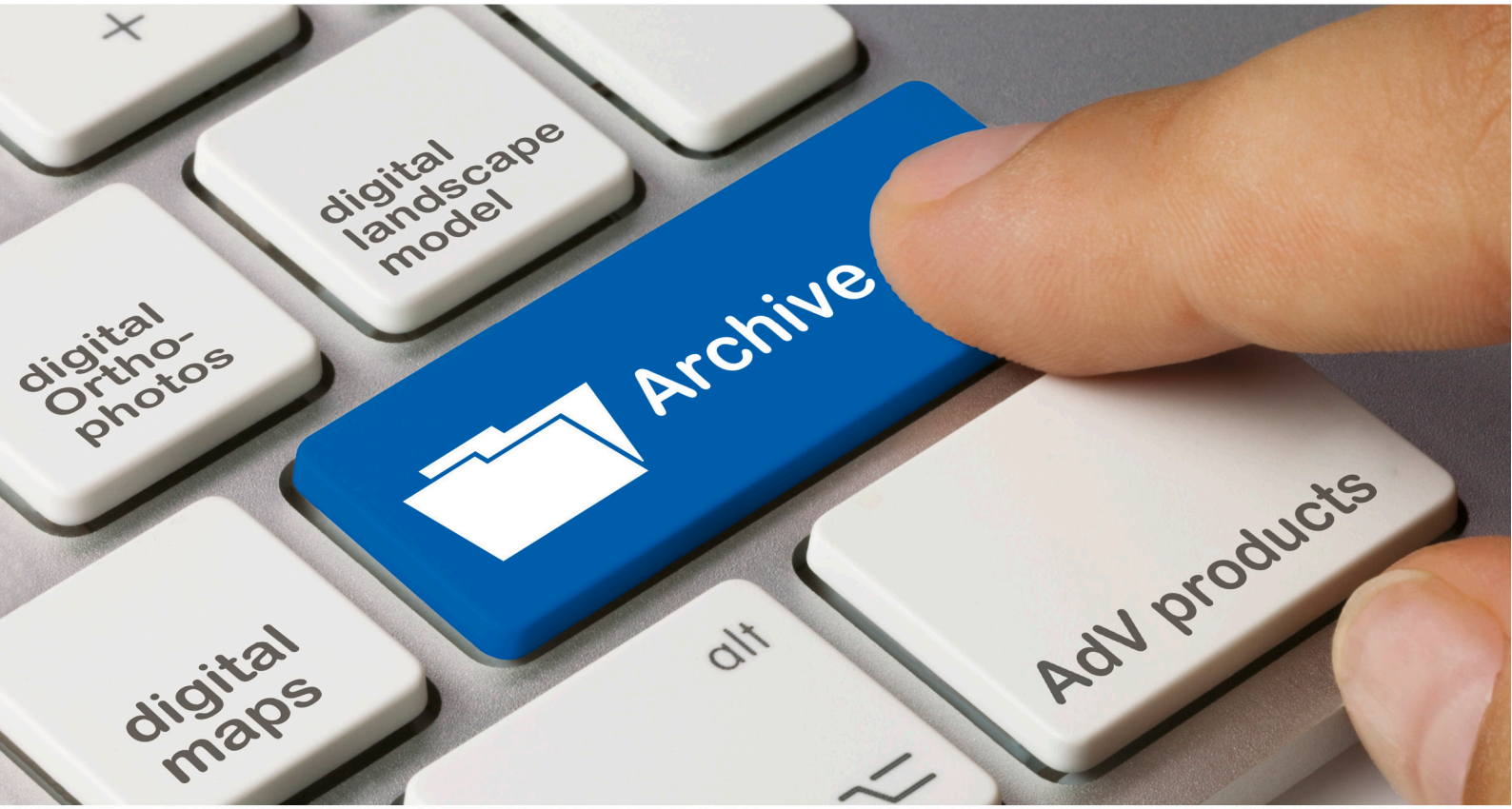
Working Committee of the Surveying Authorities
of the Laender of the Federal Republic of Germany

KLA Conference of Directors of the Archive Authorities of the Federal Government and the Laender



Guidelines

for the nationwide uniform archiving
of geographic reference data

Final Report
of the joint AdV-KLA-working group
„archiving of geographic reference data“
2014 – 2015

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1 Introduction

At the level of the Laender, there has been a proven and effective cooperation for many years between the surveying and mapping authorities and the archive authorities with regard to the delivery of analogue products, particularly maps. In the context of this cooperation, some of the results of work in the field of surveying and geoinformation become sources of lasting value. However, fewer and fewer analogue products are being created at the surveying and mapping authorities. In the future, they will predominantly produce digital data, which cannot be handed over to the archives in the same way as analogue products. Action must therefore be taken to set up basic uniform regulations for the process of archiving digital geographic reference data. This is also necessary to ensure that digital data sets that are homogeneous across the Laender can be made available to archive users.

For this reason, the Working Committee of the Surveying Authorities of the Laender of the Federal Republic of Germany (AdV) and the Conference of Directors of the Archive Authorities of the Federal Government and the Laender (KLA) (formerly the Federal Board of State Archivists [ARK]) appointed a joint working group in 2013 to develop a document on a harmonised approach to archiving digital geographic reference data.

The working group (AG) called “Archiving geographic reference data” comprised five members from the surveying and mapping authorities and five from the archive authorities. They began their work with a constitutive meeting in Potsdam on 23 July 2014. This had been preceded by a workshop on “A harmonised approach to the archiving of geographic reference data of the surveying and mapping authorities” in Potsdam on 14 and 15 November 2012, which was conducted on the initiative of the Surveying, Mapping and Geographic Reference Information Authority of Brandenburg (LGB). LGB subsequently also assumed the leadership of the AG.

Until that time, there had been no coordination between the individual Laender regarding the archiving of digital geographic reference data. The AG therefore identified products that are maintained uniformly Germany-wide at the surveying and mapping authorities. The only products not taken into consideration were those created by the federal government. Further aims of the AG are to determine the formats, time cycles and corresponding metadata for delivery to the archives and to make this information available to all the surveying and mapping authorities as the basis for a uniform approach nationwide.

This document describes in summary all the subject matter covered during the AG’s four workshops in 2014 and 2015. This content is a prerequisite for determining and implementing a joint strategy for the archiving of geographic reference data. The document thus serves as a guideline in the sense of a recommended course of action for a coordinated approach so that the digital archive material can be stored and made use of on a permanent basis in a way that is as homogeneous as possible across the Laender.

This document can therefore also be used as a recommendation for geographic data that is produced by the federal government and for which coordination is necessary between the Federal Agency for Cartography and Geodesy and the German Federal Archives.

Following its completion, the document was submitted to the two delegating bodies (AdV and KLA). It is to be presented to an audience of specialists from both sides at a joint closing event in November 2015.

The final report is divided into six chapters and covers:

- an introduction
- basic considerations regarding the archiving of geographic reference data
- metadata on the processes involved
- practical advice on offering and delivering geographic reference data
- notes on legal aspects of access to the archives of the federal government and the Laender
- a closing outlook on the future

The report additionally includes:

- a bibliography and a list of abbreviations
- an appendix with the selection policy scheme agreed on including a table with examples of metadata and data volumes and a list of the working group members

In the chapters that follow, the recommendations for action in each section are presented in a box.

2 Basic considerations for the archiving of geographic reference data

This chapter describes which criteria are used to select products for archiving in which format.

2.1 Taking stock of the surveying and mapping authorities' geographic reference data

AdV defines the term "geographic reference data" as follows:

"Geographic reference data is data from official surveying and mapping that documents and describes the landscape, the real estate and the standardised geodetic spatial reference in a way that is not application-specific. It forms the basis for technical applications with a spatial reference." (Resolution 117/11 on agenda item 5.1 of the 117th meeting of the Plenum of the Working Committee of the Surveying Authorities of the Laender of the Federal Republic of Germany in Magdeburg on 28 and 29 September 2005.) Geographic reference data can therefore exist in analogue or digital form. With regard to the AG's assignment, however, only digital geographic reference data will be considered hereinafter, without special reference being made to the fact in each case. This data comes in various technical formats and is generally designed for use in a geographic information system (GIS).

2.1.1 AdV products

AdV products are geographic reference data that is produced and updated nationwide for the whole area of Germany by the surveying and mapping authorities of the Laender – and by the federal government in individual cases – according to uniform standards and rules. These products are generally described in detail in product sheets. These also include information about the standards and rules behind the production of the products.

All the product sheets on the AdV products covered below can be found at www.adv-online.de, which takes you to the AdV home page.[1]

AdV can only make regulations for the products it is responsible for. All further considerations therefore concentrate solely on AdV products that have been deemed of archival value both by the surveying and mapping representatives and by the archive representatives following a vote at the workshops.

2.1.2 Discontinued products

Although the discontinued products are AdV products that are still available in individual surveying and mapping authorities, they are to be regarded as finished

[1] For a better understanding of the AdV products, please refer to the brochure "Digitale Daten" of Landesvermessung und Geobasisinformation Brandenburg (Brandenburg Authority of Surveying, Mapping and Geographic Reference Information).

and are not being updated any longer because of the changeover to the AAA data model (AFIS®, ATKIS®, ALKIS®: details about this are also to be found on AdV's web pages). In the real estate cadastre field, these products ("precursor products") comprise ALK and ALB data (superseded by ALKIS®). In the field of geotopography, the products Basis-DLM (in the "old" data model) and the preliminary edition of the Digital Topographic Maps (DTK-V) belong to this group.

AFIS® has replaced the control point products in the spatial reference category.

Since the migration or AAA implementation took place at a different time in each of the Laender, the AG recommends handing over at least the most recently updated version of the discontinued products to the appropriate archives (see selection policy in appendix).

Furthermore, additional earlier time slices of the discontinued products can be handed over to the archives if they are available, if this is feasible in technical terms and if the archives are interested in acquiring this data.

These data deliveries are to be arranged bilaterally.

As a general rule, the AG is in favour of precursor products being handed over as far as possible. Apart from this, the AG does not regard discontinued products as part of its assignment.

2.1.3 Land-specific peculiarities

Beyond the minimal solution of joint products of archival value, there exist in the individual Laender large quantities of additional geographic reference data or geospatial data that is likely to be of archival value from a regional point of view (e.g. Digital Topographic Map 1: 10,000 [DTK10], which is only produced in the eastern Laender). Regarding their archiving, bilateral arrangements are necessary between the surveying and mapping authority and the archive of the Land in question.

If additional geospatial and geographic reference data is maintained in individual Laender or at the federal level, the AG recommends making a decision about its archiving on the basis of this document.

To this end, a separate list of products can be compiled. In keeping with its assignment, the AG has not addressed the possible contents of such a list.

2.2 Appraisal principles for the products

A prerequisite for the organised acquisition and archiving of digital data in the archives concerned is the decision as to which data is to be classed as being of archival value. For this purpose, the AG developed a recommendation as to which geographic reference data should be preserved permanently at the archives and which can be destroyed, i.e. deleted, once the retention period has expired (see selection policy in appendix). In drawing up this recommendation

and weighing up the selection choices, the AG considered criteria related to both contents and form.

2.2.1 Overarching criteria

Using appraisal criteria, the AG selected the geographic reference data files of lasting value from a historical perspective. Criteria that played a role here were the greatest possible scope for analysis and the widest possible coverage of space and time. In this way, the AG took into consideration in its appraisal the likely very broad range of interests of future archive users.

The AG here identified two main groups of potential users: firstly, there is the group of users with local interests (e.g. local history researchers), who primarily wish to examine a particular small area of land regarding its condition at some point in the past. These currently comprise the majority of users of the archives.

Secondly, there are scientific and academic users with regional or cross-regional interests. This group pursues the aim of selecting geographic reference or geospatial data over a wide area, or of analysing segments of it but with great attention to detail. Examples include archaeologists, civil engineers, demographers, monument conservators, geologists, historians, urban planners, economists, social scientists, etc.

Being able to serve these different key interests in the future in a way that is as suitable as possible to the applications was one of the main intentions in formulating the appraisal choices related to contents.

In addition there was the criterion of avoiding redundancies. For example, the AG generally classified those products that are merely derived from other products (e.g. as in the case of the Digital Landscape Model 1: 50,000 [DGM50], which is derived from the Basis-DLM) as being less important.

2.2.2 Individual criteria for the lasting value of geographic reference data

Taking these overarching aspects as a starting point, individual criteria were named, on the final weighting of which the individual selection was then based.

The following qualities have been defined as criteria for archival value:

- high relevance of contents
- greatest level of detail within one product group (largest scale, greatest ground resolution)
- usefulness in exploring other geospatial data (Digital Topographic Maps [DTK], Orthophotos [DOP])
- milestones in the history of technology (e.g. first flight of ATKIS®-DOP40)

Criterion that limits the value for permanent preservation:

- geographic reference data that constitutes derivations or generalisations of other data (e.g. Digital Terrain Models with derived raster sizes such as DGM25)

In making the selection choices, the AG kept in mind the costs and expenditure that arise particularly in the case of large data quantities.

2.3 Temporal and spatial object definition for geographic reference data

This chapter describes the criteria according to which the AG examined the AdV products with regard to their temporal and spatial extent.

2.3.1 Delivery in time slices

For the kind of geographic reference data that is kept in technical applications (databases) the AG decided to archive the contents of the storage systems at regular intervals on a specific date. Acquiring so-called time slices is the most suitable solution for very large information systems that are subject to constant change.

Generating time slices can also be useful for databases that are periodically updated. An example of this is orthophotos, which generally constitute the results of several years of flight cycles. Here it makes sense to acquire the complete data upon completion of the flight cycle even though the individual orthophotos document completely different points in time.

The intervals at which geographic reference data is to be archived were determined taking into consideration the rates of change and the storage requirements of each of the products. They are intervals of five, ten or twenty years.

Details of the practical implementation can be found in chapter 4.2.

2.3.2 Information on the currency of AdV products

For the question as to the intervals and points in time at which geographic reference data is to be offered to and received by the archives, the criterion of "currency" is of central importance:

"Currency is a quality feature of geospatial data and covers the temporal validity of data regarding: the point in time at which it was created, how up to date the data is and the time period in which the data is valid."[2]

The currency of a product depends on how promptly existing changes have been incorporated into the product. The product "Digital Orthophoto" can, for example, be assigned unequivocal currency. Its currency corresponds to the date on which the underlying aerial image was taken. The currency of the image is assigned to the individual DOP tile (2 x 2 km) using metadata.

This statement generally also applies to Digital Terrain Models (DGM), whose currency corresponds to the time of the flight if data is created in this way on a

[2]http://www.geodaten.niedersachsen.de/portal/live.php?navigation_id=8705&article_id=25516&_psmand=28.

large scale through laser scanning and that data is then used to generate the DGM. The statement has to be qualified, however, in cases where a DGM is updated on a small scale by means of local topographic measurements or the stereoscopic analysis of aerial images.

Things are more complicated when it comes to identifying the currency of a segment of land from the ALKIS® data. Although the structure of the data model is designed to allow each object to be assigned a lifetime span (with the beginning and end of the lifetime), many objects bear the migration date (date of data transfer to ALKIS®) as the beginning of the lifetime, meaning that the "beginning" does not allow any conclusions to be drawn as to when the data was actually created. The ALKIS® database is updated as the need arises.

While the update for a demolition (e.g. building site) is carried out promptly, the update resulting from a change in the building inventory on a particular site will, in many cases, depend on whether and when the owner of the building meets his obligation to arrange for the newly erected building, which is to be documented in the real estate cadastre, to be surveyed. The time at which very large areas (e.g. changes to the coastline) are updated depends not least on the extent to which staff are available to handle this.

It is therefore impossible to make a general statement on the currency of a segment of land. Instead the term "updated daily" is resorted to. This merely expresses that this product is updated day by day.

A similar situation applies to the ATKIS® Basis-DLM database. At AdV a differentiation is made here between basic and top currency. To this end, different update cycles are stipulated for different objects. Regarding top currency, there is a catalogue for the Digital Landscape Models.[3]

All the objects not listed there should be updated at intervals of no more than five years.

Determining the currency of the DTK is also difficult. The metadata item "currency" here relates to a processing unit (a tile, for example, based on the analogue map sheets). The objects depicted in the DTK derive from the vectorial ATKIS®-DLM database. In general, the metadata item of a DTK tile merely states when this segment of land was generated as a DTK. It is therefore only indirectly possible to make a statement about the currency of the contents.

2.3.3 Spatial delimitation of the product deliveries (portioning and packaging)

One challenge in the long-term archiving of geographic reference data results from the tension between the demand for the completeness of a geospatial database and the necessity to divide the volume of data into individual packages (packaging – AIP) for the purpose of archiving it. For active use, complete,

[3] See http://www.adv-online.de/icc/extdeu/med/91a/91a50eba-659a-c041-f840-1034072e13d6,11111111-1111-1111-1111-111111111111

seamless mapping guarantees better manageability and simpler combination options.

This completeness is a disadvantage, however, when it comes to archiving because it requires keeping very large data quantities in active storage or in individual processing packages. For long-term storage it is more sensible and sometimes even essential to create portions that are delimited according to administrative borders or arbitrary grids and that only return to the active storage when required. Portioning may also be necessary to facilitate the billing of fees and to make it easier to process operations for maintaining the stock.

Since, as a rule, all products are available by now for the whole country and in seamless form, the surveying and mapping authorities have determined with what portioning (the length of one side of the land segments) the data is supplied. The recommendations are here based on the amount of data resulting from each product and the technical capabilities that the receiving system can be assumed to have. The total amounts of data of the individual products are recorded in the selection policy (see appendix), but they can also be calculated for particular sizes of tile.

It is recommended that the same standardised tiling used by AdV for supplying the products also be used when archiving them. For example, for reasons of capacity, arranging the DOP in 2 x 2 km tiles has proven to be a good option. Added to this is the fact that the metadata has also been recorded on the basis of the same tile size.

In accordance with ISO 14721, when transferred to the Land archive the packages are called Submission Information Packages (SIP) when they are acquired, Archival Information Packages (AIP) when they are stored and Dissemination Information Packages (DIP) when they are in use.

2.4 Selecting formats for delivery

This chapter describes which technical formats have been determined for products being archived. The details can be found in the selection policy in the appendix.

2.4.1 General requirements regarding archival formats

For the permanent preservation of digital data it is necessary to archive the historical data in a format that can be stored on a long-term basis and used with standard hardware and software. In the case of geographic reference data, this requirement is made more complicated by the fact that vector-based and raster-based contents exist in parallel and in relation to one another. The requirement can be met by adapting the new software environment to old data (emulation) or by adapting the old data to new environments (migration of files and structures).

Based on previous practical experience at the archives, the AG is focusing on the migration approach. This is generally achieved by the fact that already at the point when the data is transferred from the living system, certain formats are derived that are presumed to be interpretable for the long term.

The choice of specific preservation formats is in line with the state of international scholarly discussion. It must therefore take into account the significant characteristics of the respective geospatial databases. At the same time, the expected requirements of future users (designated community) also need to be included in the considerations. Therefore, since not all the conceivable requirements of the future can be met, it was necessary here, too, to make a selection which, with regard to user types, was geared towards the categories of people mentioned in chapter 2.2.1.

The choice of preservation format should generally be made individually for each database to be transmitted. Ultimately, however, it was often possible to apply the AG's considerations regarding significant characteristics to whole product groups.

2.4.2 Vector data

ESRI Shape, the Geographic Markup Language (GML) profile "Norm-based Exchange Interface (NAS)" and generic GML were debated as formats for vector geometry data.

The AG decided against recommending ESRI Shape as the standard preservation format. Compared to more highly developed formats, ESRI Shape has the following deficiencies:

- the lack of an option to display point-to-point connections (topologies)
- the lack of an option to display arcs
- the multiplication of individual files when it comes to geographical themes with many feature types (an ESRI Shape level consists of up to seven individual files)
- no national or international standard, but rather a company standard

By contrast all the participants consider the GML format to present great opportunities. This language can be specified and adapted in so-called "profiles", of which the simplest is the so-called "Simple Features" profile. For Germany this standard has been implemented in the form of the GML profile NAS for the AAA schema and thus as the standard interface for AdV products.

After careful consideration the AG is in favour of aiming, as a rule, for the NAS format when it comes to AdV products in a vector data format. If this format is not available for a delivery, ESRI Shape or GML Simple Features should be delivered (e.g. for Official Building Polygons). If only point geometries are delivered, supplying CSV tables is sufficient.

2.4.3 Raster images

For a long time the TIFF format was under discussion for raster data from imaging procedures. Although it is not an ISO standard, this format, which has been stable since 1992, has proven successful. Nonetheless this format has distinct disadvantages that have meanwhile led to a move away from it:

- When stored in uncompressed form (1 pixel = a defined number of bits) data quantities are reached that are uneconomic.
- The compression standards allowed in TIFF for the image data contained (lossy such as JPEG or lossless such as LZW) are not very up to date and unnecessarily increase the complexity. As a standard, TIFF has so many variants that validation software may be unable to handle it.

Owing to the growing acceptance of JPEG2000 at the archives, the AG recommends transferring data in this format. The use of the lossless compression version is currently to be preferred.

As an alternative, a transfer can also be made in the TIFF format without or with lossless compression.

If a lossy compression in JPEG2000 appears acceptable, documentary evidence on the precise extent of the loss incurred should be kept.

A significant characteristic of digital geographic raster data is spatial referencing. It is thus self-evident that each geospatial data package is provided with frame coordinates (bounding boxes).

These may be supplied either through entries in the file header (in the so-called GeoTIFF) or by means of accompanying files with the same name with the ending “XXw” (XX being two letters of the appropriate format identification code, e.g. tfw or j2w).

JPEG2000, TIFF and JPEG can all be spatially referenced with the procedure described above, called a World File, which is why this method of spatial referencing is recommended.

Independently of the issue regarding the format of the medium, the question remained open in the AG workshops as to how the significantly increasing data quantities from remote sensing are to be handled in the future (infrared channel, more colour values per channel, greater ground resolution). With regard to both the raster data format and the compression algorithms, all the Laender should pay close attention to technical discussions in surveying and mapping and in archive management and, if necessary, initiate format migrations or changes to the delivery guidelines.

2.4.4 Data tables, point geometries, non-pictorial raster data

For data tables, point geometries (e.g. control points) and non-pictorial raster data (e.g. DGM), the AG decided on the established standards CSV and ASCII (fixed width format). The description of the fields and tables should be done in an XML document; as an alternative, text documents are permitted.

The reference for valid CSV is the recommended standard IETF RFC 4180. If fixed width formats exist, these should be added using clear delimiters (e.g. commas or semicolons).

2.4.5 Accompanying text documents

For text documents, e.g. metadata that describes the data delivery, the only option is the PDF/A format. The choice of the specific version is to be clarified bilaterally.

2.4.6 Transfer containers

In some cases large quantities of data will require the use of container formats. Such container formats additionally make it possible to check the integrity of the files contained using checksums. ZIP and TAR/GZIP are suitable for this.

2.4.7 Coordinates for spatial referencing

In individual Laender and with discontinued products it may still happen that coordinates with Gauss-Krüger mapping (GK) are delivered to the archives. The mapping system for spatial referencing that is now prevalent in Germany is UTM (Universal Transverse Mercator projection).

From the user's point of view the geodetic datum (ETRS89/Bessel) should be specified in the metadata at least for the sake of completeness.

The difference in the coordinate values is clearly visible even for laypeople, which means that no confusion can arise.

The archives acquiring the data are required to configure their catalogue systems in such a way that a possibly occurring duality of coordinate systems can be accommodated.

2.4.8 Summary

Type of information	**Format**
Vector data	• Norm-based Exchange Interface NAS, in the form of NBA (if available), e.g. ALKIS® and ATKIS® • CSV (if only point geometries) • ESRI Shapefile or GML Simple Features (if no NAS format is available)
Raster images	• JPEG2000, losslessly compressed, e.g. DOP • Alternatively TIFF (either uncompressed or with LZW or CCITT Fax 4 compression), e.g. DTK and DTK-V • All raster images should be supplied at all times with coordinate frames using the World File method
Data tables, point geometries, non-	• CSV (comma-separated values) in accordance

Type of information	Format
pictorial raster data	with IETF RFC 4180[4] • XML-based description of the table and its fields, alternatively text document
Accompanying text documents	• PDF/A (version subject to consultation)
Transfer containers	• ZIP • TAR/GZIP
Coordinates	• Universal Transverse Mercator projection (UTM) • Gauss-Krüger (GK)

Table 1: Overview of the formats to be used

[4] https://tools.ietf.org/html/rfc4180.

3 Metadata in the processes involved

This chapter outlines which metadata is required when delivering geographic reference data to the archive authorities.

3.1 Use of the metadata standard ISO 19115

Geographic reference data, like most other digital objects, cannot be interpreted completely authentically or correctly without additional data. Geographic reference data that is to be archived should therefore be provided with metadata, which is a prerequisite for understanding, preserving and searching it and for recombining it with other data.

In this case, metadata is understood to mean data that serves the purpose of describing, preserving or managing geospatial data and that is compiled by the surveying and mapping authorities in a standardised, machine-readable form.

The metadata standard for geospatial data, ISO 19115[5], plays an important role in the archiving process. The AG recommends that the surveying and mapping authorities always supply the complete data set in accordance with the AdV metadata profile for the sake of consistency. It is the role of the archives to decide how this metadata is handled and how it can be used for further archiving (see “Metadata” table in appendix).

Besides metadata, accompanying information material should also be supplied, e.g. text documents (such as product sheets and format specifications) or videos (as training assistance).

3.2 Proposal of selected metadata for transferring geospatial data and making it available

The following list contains a small selection of the metadata from ISO standard 19115 (“ISO Metadata”) that is particularly relevant from an archival point of view or needed for the transfer process.

For readers from the archival field, it serves above all to familiarise them with the most important metadata from the surveying and mapping authorities. This metadata is marked with ISO/INSPIRE, which refers to the ISO standard and the European INSPIRE directive.

For surveying and mapping experts, on the other hand, the remaining metadata is primarily of interest, which serves the purpose of preserving and managing the archived data. This is always at the beginning of the list.

[5] http://www.iso.org/iso/home/store/catalogue_ics/catalogue_detail_ics.htm?csnumber=53798; German translation at http://www.geoportal.de/SharedDocs/Downloads/DE/GDI-DE/Deutsche_Uebersetzung_der_ISO-Felder.html.

The explanations are selected in such a way that both those on the side of the surveying and mapping authorities and those on the archival side can develop an understanding of the metadata.

3.2.1 The most important metadata for cataloguing and use

- Number of files contained
- Title (ISO/INSPIRE): designation by which the resource is known
- Alternative title (ISO/INSPIRE)
- Author (ISO/INSPIRE): the submitting authority (surveying and mapping authority)
- Details of the dates (ISO/INSPIRE) of the creation, publication or revision of the resource
- Date of issue (ISO/INSPIRE): on publication
- Bounding box of the resource (ISO/INSPIRE): extent (frame of the package defined by two pairs of coordinates) or (if frame not definable) coordinates of central point and extent
    - Note: For archival cataloguing systems it may not always be the case that coordinates can be processed conveniently during a transition period. If location information is available (e.g. place names for DTK25) it is a good idea to add this to the packages to facilitate a large-scale search even without the use of GIS. A web-based gazetteer service to search for places would also be an option.
- Spatial representation (ISO/INSPIRE): term for vector, raster or grid data type
- Spatial resolution (ISO/INSPIRE): level of detail, specified by a scale number or ground resolution

3.2.2 The most important metadata for transfer

- File sizes for validity checks
- Biunique filename with restricted length
- Checksum: for the data transmitted; possibly covered by container formats!
- Contact for the resource (ISO/INSPIRE): the submitting authority
- Estimated size of a delivery unit

3.2.3 The most important metadata regarding data structure and significance

- Descriptions of the individual fields of the textual feature attributes
- Purpose and revision (ISO/INSPIRE)
- Theme (ISO/INSPIRE)

- Temporal extent (ISO/INSPIRE)
- Details of use (ISO/INSPIRE)
- Quality report (ISO/INSPIRE): information on the positional accuracy and completeness of the product
- Updating (ISO/INSPIRE): when the next update will be conducted

3.2.4 The most important metadata for maintaining the stock

- Decompression method (ISO/INSPIRE): compression algorithm for geographic reference data[6]
- Presentation form (ISO/INSPIRE)
- Production environment (ISO/INSPIRE): e.g. software, operating system
- Designation of data format (ISO/INSPIRE): description of the format used by the distribution point

[6] This specification refers to data streams of geospatial data objects not to the delivery as a whole.

4 Practical advice on offering and delivering geographic reference data

The following chapter provides specific procedural recommendations for the implementation of the data delivery to the archives by the surveying and mapping authorities.

4.1 Model procedure for the transfer of digital records

The withdrawal of electronic records from official bodies is typically performed in four steps (so-called four-stage process):

1.) Offering: the submitting authority sends a disposition list to the competent archive, indicating which electronic records (digital data) are to be transferred from active storage to long-term storage.

2.) Appraisal: the competent archive decides which parts of the data offered are of archival value and which can be destroyed.

3.) Preparing for delivery: the digital data marked as being of archival value is processed by the submitting authority, ready for delivery to the archive. To this end, the data, the metadata necessary for its interpretation and the available documentation material on it are exported from the storage system of the submitting authority in a form and structure agreed on in advance and formed into a submission package (SIP). The contents of the submission package are described by the submitting authority in an electronically recorded delivery index.

4.) Delivery: the submitting authority transfers the digital data of archival value to the competent archive. The archive is notified of the transfer by means of a delivery index listing the data actually transferred. Once the transmission path and, if applicable, the data storage device to be used (hard drive, DVD, USB flash drive, magnetic tape, etc.) have been agreed on, the submission package is forwarded to the archive. The archive confirms receipt of the package and confirms the completeness and integrity of the digital data it contains. If the digital data transferred is intended for deletion at the authority, the authority must not delete the withdrawn data from its own system until the archive's confirmation of receipt has been received.

For geographic reference data the AG has already defined the archival value for individual products by means of a selection policy. Time slices and data formats were also taken into consideration here (see selection policy scheme in appendix). This means that process steps 1) and 2) can be omitted as a rule. The result is a shortened delivery process in which the geographic reference data can immediately be processed by the surveying and mapping authority ready for delivery to the archive.

Specifically, this means that metadata the AG has agreed on in advance (see chapter 3) can be prepared and additional accompanying documents added to the data package (SIP). The actual data sets are exported from the storage system and combined with the metadata and relevant documentation material to

form a submission package. In a final step the archive receives the data from the surveying and mapping authority by means of a data storage device. Following a thorough inspection of the data by the archives, a confirmation of receipt is issued.

Once the confirmation of receipt has been received, responsibility for deleting the data supplied or using it for further in-house purposes lies with the authority submitting the data. In this context, both legal aspects (data protection, obligations for secrecy and deletion) and economic aspects are to be taken into consideration.

In each case the transfer process should be fully clarified in advance in a bilateral agreement between the surveying and mapping authority and the archive so that there are only details left to be clarified for each withdrawal.

4.2 Questions to be clarified when an AdV product is supplied for the first time

When an AdV product is supplied for the first time, the two parties should agree on the time at which the digital objects on which the product is based are to be delivered to the archive in the form of digital data. This time is generally set according to the dispensability of an object. For AdV products that consist of a great many individual objects and are maintained in databases, it is generally not possible to precisely define the moment of dispensability (see chapter 2.3.1 for details on this).

Instead so-called time slices are formed containing both very up-to-date and very old objects. Regarding the periods of time between the origination or formation of the time slice, its export from the production system and its delivery, the following variants are possible:

1. Export and delivery of the data immediately in the year fixed according to the regular schedule for the origination or formation of a time slice (see selection policy scheme).
2. Export of the data in the year fixed according to the regular schedule, but: further storage on data storage devices of the submitting authority. Delivery of the objects to the archive after a period of time to be agreed on with the archive.
3. Export and delivery of the data only after a period of time to be agreed on with the competent archive. This requires that the object selection or time slice for the year fixed according to the regular schedule can be authentically restored retrospectively!

Below example dates are given for the different variants.

Variant	**Date of time slice** specified by the selection policy	**Date of export** variable, very technology-dependent	**Date of delivery** variable

Variant 1	2010, 1 January	2010, 3 January	2010, 18 January
Variant 2	2010, 1 January	2010, 3 January	2019
Variant 3	2010, 1 January	2019	2019

Table 2: Comparison of export variants

Here the AG recommends variant 1, i.e. the immediate delivery of the data from the surveying and mapping authorities to the archives in the year fixed in accordance with the selection policy.

The commitment to one variant goes hand in hand with when the supplied digital data can be used and passed on in accordance with the regulations of the relevant archive law. See information on this in chapter 5.

4.2.1 Setting the exact time of the time slice

The AG has decided to stipulate the same time slices for data delivery to the archives in all the Laender so as to maintain the homogeneity of nationwide map series.

The delivery is made on the basis of the current GeoInfoDok reference version decided on by AdV (in 2015 that is GeoInfoDok version 6.0 – resolution 120/2 of the AdV Plenum from the year 2008).

The year of the first data delivery is left up to the Laender, but it should be as early as possible.

The following time slice dates should always be adhered to:

always on 1 January

- for a 5-year cycle: 2010, 2015, 2020 …
- for a 10-year cycle: 2010, 2020, 2030 …
- for a 20-year cycle: 2020, 2040, 2060 …

Any more extensive agreements should be made at the bilateral level.

For basic considerations on this see chapter 2.3.1.

4.2.2 Deciding on pilots

The AG discussed which AdV data holdings should be used to begin the delivery of geographic reference data to the archives in 2015. Here it was important to select one raster data and one vector data product.

The AG agreed to choose the product DTK25 and the ATKIS® Basis-DLM as pilots for the first delivery.

4.2.3 Deciding on the creation of filenames

In order to make further processing of the acquired data in the archives easier or even possible in the first place, it is necessary to establish conventions for

creating the filenames that are to be used. In particular, biunique filenames should be used whose length and encoding do not exceed the file systems' specifications.

4.2.4 *Portioning the delivery*

Since it can be assumed that the geographic reference data to be supplied will need to be divided into numerous sub-portions/tiles – for practical reasons in many cases but also for the sake of better usability – a decision should be made as to the way in which this is done. The following options are possible:

- transferring the data in the traditionally used map sheets (e.g. for DTK)
- transferring the data in a specific tile size (e.g. vector data such as ALKIS® or ATKIS® Basis-DLM)
- transferring the data at the level of administrative districts (e.g. export exactly up to the administrative border or using a rectangle that encloses the administrative district)

The choice of the appropriate divisions should be guided not least by the resulting file sizes.

The standard procedures of the surveying and mapping authorities[7] lend themselves to replication. The choice of procedure should be documented.

For basic considerations on this see chapter 2.3.3.

4.2.5 *Packaging the delivery*

An individual submission package (SIP) usually consists of the following components:

- primary data (= geographic reference data in the narrow sense)
- metadata to describe the data supplied (metadata in accordance with ISO standard 19115 – see chapter 4 and appendix)
- accompanying documentation material (process documentation/description, training material, set-up instructions, guidelines/directions for use, etc.)

It should be agreed with the archive acquiring the data as to how exactly the entire submission package or the individual packages contained are to be configured.

[7] As an example, please refer to the technical guidelines for the data exchange of the ATKIS® Basis-DLM: http://www.adv-online.de/icc/extdeu/med/179/179289a4-04a0-a214-3dcf-eb508a438ad1,11111111-1111-1111-1111-111111111111

4.2.6 *Deciding on the relationship between metadata and file objects*

Metadata can be directly attached to each individual file object as an XML file; alternatively, it can be supplied in a list for the entire submission package referring to each of the objects contained. In the latter case it should be agreed as to which biunique identifier can be used to match the metadata with the file objects.

The AG recommends agreeing bilaterally in advance with the archive acquiring the data to clarify the metadata delivery.

4.2.7 *Deciding on the compression method*

Owing to the sometimes quite substantial extent of the data volumes to be transmitted, ZIP or TAR/GZIP is recommended as the packing/compression method to be used.

4.2.8 *Deciding on security features for an unaltered and secure transmission*

In order to guarantee the data security and integrity of the data supplied and to be able to check this once the archive has received it, security features need to be agreed on, such as:

- checksum / hash value creation
- encryption methods
- digital signature (only when requested by both parties)

The AG is in agreement that data deliveries do not need to be digitally signed. Rather, it is sufficient if a few security measures are implemented when the data is transmitted and received, such as the checking of checksums / hash values, in order to rule out manipulation and prevent any falsification. The data can be delivered to the archives in encrypted or unencrypted form.

A transparent approach to the process of ensuring authenticity and integrity, including its long-term documentation, increases the level of trust in the data producer and the archive.

4.2.9 *Agreeing on the future delivery procedure*

A written agreement between the surveying and mapping authority and the appropriate archive should be used to establish which of the arrangements made in this way are also to apply to future transfers and therefore do not need to be agreed on each time again.

4.3 Points to be agreed on for each submission of an AdV product

Even if all the major features and process steps have been agreed on for the long term in the way described above, it is advisable for the submitting authority to contact the archive in good time for all further transfers too.

4.3.1 Deciding on the time of delivery

Because of the sometimes considerable amounts of data, the precise time of delivery, in particular, needs to be agreed on between the submitting authority and the archive each time.

Especially in the case of extensive data deliveries, the archive must have the time to make the necessary resources available for storing the data.

4.3.2 Deciding on the transmission path

For data security reasons and also owing to the quantities of data, it is not possible to simply transmit the data to be delivered in the classical way (email). For this reason the transmission path should be agreed on between the issuing authority and the archive. Since the basic conditions for this are constantly changing, this question should be considered anew for each delivery.

Possible options include:

- secure connection
- external hard drive
- optical data storage device
- FTP service

5 Legal aspects of access to geographic reference data in the archives of the federal government and the Laender

This chapter describes when and how, from a legal point of view, it will be possible to access geographic reference data in the archives in the future.

5.1 Terms

First the general terminology will be explained for better understanding.

5.1.1 Retention

The retention of finalised geographic reference data until the end of the retention period is the responsibility of the competent surveying and mapping authorities. Defining the retention period is also one of its tasks, provided there are no applicable legal regulations on the subject. The right of disposal of the geographic reference data also lies with the surveying and mapping authorities during the time of retention.

5.1.2 Archiving

The archiving of geographic reference data is the responsibility of the competent archives. This task includes appraising the geographic reference data as to its archival value, acquiring as archive material those parts determined as being of archival value, and indefinitely safekeeping and preserving them and making them accessible and available.

5.1.3 Archive material

The geographic reference data only becomes archive material – through repurposing – when the competent archive has made a positive selection decision, the time for the time slice has come and/or the retention period has expired and the data has definitively been transferred to the archive. With the repurposing, the right of disposal of the geographic reference data passes from the surveying and mapping authority to the archive.

Records acquired before the retention period expires (“pre-archival records”) are not considered in these guidelines.

5.2 Application of the archive law currently in force

Since archive law falls under the regulatory power of the agencies that maintain the archives, every Land and the federal government each have their own archive law.[8] These archive laws of the federal government and the Laender differ from one another, particularly regarding individual details of access. For this

[8] A list of the archive laws of the federal government and the Laender can be found at http://www.archivschule.de, the website of the Archives School Marburg.

reason the following outline only reflects the general tendencies of the archive laws and cannot replace the specific examination of the appropriate individual regulation for individual cases. Nonetheless all the archive laws of the federal government and the Laender essentially contain similar access regulations, which makes it possible to provide an overview and a rough outline of the shared contents. This does not preclude the need for bilateral arrangements to be made between the surveying and mapping authorities and the archives.

5.3 Aim and differentiation of the access regulations in the archive laws

All the access regulations of the archive laws of the federal government and the Laender are aimed at meeting the requirements of data protection and, equally, complying with citizens' need for information, the freedom of science and teaching, and any interest on the part of the submitting authorities to continue accessing the material.

Here the archive laws fundamentally differentiate between archive material and records that have been acquired before the expiry of the retention periods (transitional records, pre-archival records). [9]

A second differentiation of access possibilities according to archive law is made according to user groups. Here a distinction is essentially made between the submitting authorities, affected parties and third parties. Furthermore there are sometimes different conditions of use depending on whether it is a matter of legal or academic research.

Moreover the archive laws differentiate between access options according to formal criteria. Here a distinction is made between records that have already been published or were intended for publication, "normal" official records without any personal details and records that contain personal information and are therefore subject to particular protection periods. [10]

From the point of view of the surveying and mapping authorities, published geographic reference data can be regarded as data that is accessible to everyone, freely available (but not free of charge) and without legal obstacles.

5.4 Status of geographic reference data in access law

In all the archive laws of the federal government and the Laender, archive material is subject to the complete access regulations of archive law. For geographic reference data, which is to be understood as archive material in this context, the access principles of archive law described in more detail in chapter 5.8 apply at the archive. This is the case irrespective of whether the submitting authority has decided to delete the geographic reference data provided or to

[9] The status "transitional records" and "pre-archival records" can be disregarded in this context.

[10] The fourth category taken into account in the archive laws, namely that of confidential, protected records, can be disregarded in this context.

continue to keep it available at the authority after archiving.[11] Legal rights standardised beyond archive law and granting access to specific records may also be significant in some circumstances.

5.5 User groups

In this section the different user groups are described.

5.5.1 Submitting authorities

The submitting authorities and their functional and legal successors enjoy privileged access rights in the archive laws of the federal government and the Laender. They are entitled to use at any time data that originated with them and has been taken on by the archive. This right is restricted, however, in some archive laws for data that is subject to data deletion or data access regulations and which should therefore be withdrawn from the scope of the submitting authority by law. For the field of geographic reference data, however, these regulations are largely irrelevant. Far more significant when it comes to allowing submitting authorities to draw on geographic reference data is the question as to how the privileged access right mentioned above can be realised in practice. On this subject please refer to the information in chapter 5.8.

5.5.2 Affected parties

A second privileged user group according to archive law is that of the “affected parties”. In the archive laws of the federal government and the Laender, these enjoy an extensive right to information or inspection for archive material if it refers to them personally. In the area of archived geographic reference data, this regulation is significant above all for the area of real estate data. It means that affected parties can and must be granted access to this data irrespective of other legal rights and without having to observe any relevant protection periods.

5.5.3 Third parties

According to the archive laws of the federal government and the Laender, everyone is basically entitled to the right to use archive material within the scope of the appropriate regulations of archive law. Although some archive laws make access to the material dependent on substantiating a legitimate interest, this is a vague legal concept that almost never leads to denial of access in everyday archive business. More relevant in practical terms, by contrast, are the detailed regulations in archive law that reconcile this general right to access with the requirements of data protection law. For this, all the archive laws of the federal government and the Laender provide for the governing of third-party access by means of protection periods (see chapter 5.6 ff.). Once the protection periods have expired, everyone is granted access to the archive material without

[11] The responsibility to verify the legal conformity of a redundant data storage of this kind and the legal conformity of making the data available in any way at the authority lies with the submitting authority in this case.

restriction – unless there exists one of the special reasons for a restriction of use that are described in the archive laws of the federal government and the Laender (see chapter 5.7). These provisions function as a kind of safety net for those cases in which the protection periods were not long enough or could not be applied.

5.6 Protection periods

This chapter outlines the various protection periods.

5.6.1 Handling of published data

Fundamentally excluded from the possibility of access being governed by protection periods is data that has already been published or that was intended for publication when it was created. These archive records can basically be used at the archive by any authorised persons without any further constraints and without any adherence to protection periods. This regulation, which otherwise generally constitutes an exceptional case in an archival context, is of central importance when it comes to archived geographic reference data. Since a crucial feature of the AdV products is the principle of the database being public, a large proportion of archived geographic reference data can be classed as “published”. If this is the case, after it has been acquired by the archive the data is to be provided to the relevant users without applying protection periods. The concept of usability is not to be equated here with exemption from charges, rather it means fundamental accessibility to anyone.

All the AdV products were considered by the AG to be published with the exception of the ALKIS® data that is subject to data protection. Such data is only available to a limited group of users with proof of a legitimate interest. Furthermore “Underground Monuments” and historical point information in the AFIS® product are subject to special protection (see selection policy in appendix).

5.6.2 General protection period

According to the archive laws of the federal government and the Laender, data that was not intended for publication is subject to a general protection period of 30 years during which access for everyone is not provided for. As a rule this protection period can, however, be shortened (i.e. ended) by filing an application, although the Laender have different ways of regulating the procedure for filing and justifying applications and for approving them.

5.6.3 Protection periods for archive material containing personal information

There are stricter regulations for the protection of archive material containing personal information, i.e. data that, due to its purpose or essential content, relates to one or more natural persons. Such archive material is excluded from use (for slightly differing periods of time) under the federal government and in the Laender even beyond the death of the affected persons. Here, too, it is possible to shorten the protection periods upon special application but this is usually only done after a significantly more critical and complex verification procedure and a careful weighing of interests. For access to archived geographic reference data, the protection periods for personal data are relevant above all in the area of the

real estate cadastre to the extent that the data is enriched with or linked to details about natural persons. During the protection period it will only be possible for everyone to access this data if the protection period is shortened. This must be justified separately in each case.

5.6.4 Restricting access to archive material in special cases

Irrespective of the protection periods mentioned, access to archive material can also be denied, limited or made subject to conditions if there are important reasons to do so. The list of these reasons varies from one archive law to another but generally contains matters of fact such as a threat to the welfare of the Federal Republic of Germany or of a Land, a violation of legitimate or protectable interests of third parties, unreasonable expenditure for provision, and possible damage to the archive material in question. For access to archived geographic reference data, restrictions on this basis are possible.

In the view of the AG this could apply to “Underground Monuments” in AFIS®.

5.7 Access to archive material on the basis of statutory provisions beyond archive law

Before being repurposed as archive material, access to geographic reference data follows

a) the surveying, mapping and cadastral laws of the Laender

b) the geospatial data access laws or geospatial data infrastructure laws of the Laender

c) any other rules that justify access to the records of public bodies

After being repurposed as archive material, access to geographic reference data essentially follows the archive laws of the Laender. In practice, however, conflicts can arise between a right to access resulting from the rules described in a) and c) (for example: “the owners are to be provided with ... upon application”) and the right to access based on the archive laws of the Laender. A conflict between a right to access resulting from the rules mentioned in b) and the right to access based on the archive laws of the Laender is not possible. After being repurposed as archive material, geographic reference data is “no longer in use” and is thus excluded from the scope of the rules mentioned in b).[12]

[12] See Neumann, Conrad: Zugang zu Geodaten. Neue Impulse für das Informationsverwaltungsrecht durch die INSPIRE-Richtlinie (Beiträge zum Informationsrecht Band 35), Berlin 2014, p. 554 (Neumann refers to the geospatial data access law of the federal government). See also Article 7, para. 3, sentence 1 of Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 on establishing an Infrastructure for Spatial Information in the European Community (INSPIRE).

A conflict of rules should always be resolved on the basis of the conflict-of-law rule “lex specialis derogat legi generali” (the more specific law has precedence over the more general law).

Therefore if the statutory provisions regarding access to geographic reference data merely grant the right to a decision without abuse of discretion (for example: “... can be provided to anyone provided this does not conflict with public interests”), the rules of the archive access law will take precedence.

5.8 Possible types of access

In the archive laws of the federal government and the Laender, the concept of access (use, utilisation, exploitation) is used as a vague legal concept that is generally only defined more precisely in the appropriate implementation regulations, schedules of fees and reading room regulations. Here all the archives define as a “normal” case of use the situation in which the user personally inspects the material in the archive’s reading room or, if this is not possible, in which the user is given an answer to a specific enquiry in writing or by telephone. As an additional form of use, the provision of reproductions plays a considerably less important role than the two scenarios described above.

According to most regulations of use, there is no legal entitlement to the provision of such reproductions; the number of copies is often restricted owing to limited reproduction capacities and the issue of reproductions is subject to charge.

So far none of the state archives in Germany have implemented a “digital reading room” that can be used via the Internet. The growing volume of electronic data that is being delivered by the authorities and courts will, however, make it necessary in the foreseeable future to create a suitable infrastructure for users to be able to inspect the electronic documents in a suitable form in the reading room and – where legally possible – for duplicates of the archived data to be made available to them where applicable.

6 Outlook on the future

For the surveying and mapping authorities within AdV, work with and storage of digital geographic reference data has been part of daily business for many years now. In the domain of the archive authorities, on the other hand, handling digital media and its peculiarities in archiving has only recently become a focus. Work on expanding the archives to include the option of archiving and providing digital data for their users has therefore not yet been fully completed nor has it been done in all areas. Through these guidelines and the associated recommendations for action, it will be possible to make progress in the long-term preservation of geographic reference data by the archives since it facilitates a uniform approach.

Following approval by AdV and KLA, the concept described here should be reviewed by the working group every five years in order to implement any need for change resulting from practical experience, include any new products and/or adjust time cycles.

Beyond the scope of their own activities and this document, the AG encourages the surveying and mapping authorities and the archive authorities to pursue more in-depth bilateral communication with one another for mutual benefit and for the purpose of fostering greater understanding of the respective other party.

The first official delivery of geographic reference data to the archives is to begin before the end of 2015.

I Commented bibliography

Projekt Ellipse (2013): Konzeption der Archivierung von Geobasisdaten des Bundesrechts

http://www.swisstopo.admin.ch/internet/swisstopo/de/home/topics/geodata/geoarchive.parsysrelated1.29968.downloadList.70421.DownloadFile.tmp/konzeptberichtellipsev1.3publikationde.pdf

A study that examines all the aspects of the life cycle in an exemplary way and includes a strategy for implementation.

AG AGL (2013): Archivierung von Geobasisdaten im Kontext der Gesamtüberlieferung des Vermessungswesens (2013). Final report of the AG "Archiving LGL Geographic Reference Data" (AG AGL)

http://www.landesarchiv-bw.de/sixcms/media.php/120/55893/LGL43_Abschlussbericht_130624_6.pdf

Final report of a pilot phase of archiving geographic reference data in Baden-Württemberg. This pilot phase was supported by a working group and involved several transfers of data. Pertains to the appraisal (including value criteria, so-called appraisal reasons) and basic procedure of delivering data.

EuroSDR Working Group Geographic Data Archiving (2014): GI+100: Long term preservation of digital Geographic Information – 16 fundamental principles

http://eurosdr-ireland.net/archiving/GI+100%20-%2016%20EuroSDR%20Archiving%20Principles_V3%201.pdf

A list, revised in 2011/2012, of the most important aspects to pay attention to in the field of archiving geographic reference data. In version 3 (2014) only the support of the European expert bodies EBNA, EuroGeographics and EuroSDR was noted.

Steve Morris (2010): Appraisal and Selection of Geospatial Data White Paper, Prepared for Library of Congress
http://www.digitalpreservation.gov/meetings/documents/othermeetings/AppraisalSelection_whitepaper_final.pdf

Considerations on assessing the value of geospatial data as a permanent resource, particularly overarching criteria for assessing value. Refers to previous publications in the English-speaking world.

Archivreferentenkonferenz (AG ESys and IT committee) (2009): Handreichung zur Archivierung elektronisch vorliegender Geodaten

http://www.bundesarchiv.de/imperia/md/content/bundesarchiv_de/fachinformation/ark/handreichung_geodaten_20090928.pdf

At the time a leading description of the tasks that would be faced in the life cycle of geospatial data from an archival point of view.

Magenta Book (ISO 14721) (2012): OAIS Standard 2012

http://public.ccsds.org/publications/archive/650x0m2.pdf

nestor-Materialien 16 (2013): Referenzmodell OAIS – German translation version 2.0

http://nbn-resolving.de/urn/resolver.pl?urn=urn:nbn:de:0008-2013082706

Open Archival Information System (OAIS) is the functional standard for digital archives.

II List of abbreviations

AdV – Working Committee of the Surveying Authorities of the Laender of the Federal Republic of Germany

AG – working group

AAA data model – consisting of **A**LKIS®, **A**TKIS® and **A**FIS®

ALKIS® – Authoritative Real Estate Cadastre Information System

ATKIS® – Authoritative Topographic-Cartographic Information System

AFIS® – Authoritative Control Point Information System

AKS – automated data on purchasing prices

ALK – Automated Real Estate Map

ALB – Automated Real Estate Book

AG AGL – KLA working group “Archiving LGL Geographic Reference Data”

AG ESys – KLA working group “Electronic Systems in Justice and Administration”

(Geo)-**AIP** – Archival Information Package

(Geo)-**DIP** – Dissemination Information Package

(Geo)-**SIP** – Submission Information Package

BRW – Standard Land Value

DGM – Digital Terrain Model

DLM – Digital Landscape Model

DTK – Digital Topographic Map

DTK-V – Digital Topographic Map, preliminary edition

DOP – Digital Orthophoto

EDBS – Uniform Database Interface

EuroSDR – Pan-European Organisation for Spatial Data Research

ETRS – European Terrestrial Reference System

GeoInfoDok – Documentation on the Modelling of Geoinformation of Official Surveying and Mapping

GIS – geographic information system

GML – Geography Markup Language

IETF – Internet Engineering Task Force

ISO – International Organization for Standardization

INSPIRE – Infrastructure for Spatial Information in Europe

KLA – Conference of Directors of the Archive Authorities of the Federal Government and the Laender

LZW – data compression technique after Lempel, Ziv and Welch

LGB – Surveying, Mapping and Geographic Reference Information Authority of Brandenburg

LGL – Baden-Württemberg Agency for Geoinformation and Rural Development

LOD – level of detail

NAS – Norm-based Exchange Interface

NBA – User-Oriented Inventory Data Updating

OAIS – Open Archival Information System,
common abbreviation for ISO standard 14721

RGB – red, green, blue

RGBI – red, green, blue, infrared

RFC – Request for Comments

UTM – Universal Transverse Mercator projection

ZIP – format for compressed data

III Appendix

Selection policy scheme including examples of metadata and data volumes

Consecutive no.	Name	Origin, contents, function	Appraisal	Comments	Launch year	Interval	Submission form	Scale / raster size	Published
1	**Real Estate Cadastre**								
1.1	ALKIS	Documentation of the real estate cadastre	A		Depends on Land	5 years (more frequent delivery on Land-specific basis)	XML format portioned (at archive's request) in the form of complete NBA basic configuration; optionally in addition: TIFF+TFW or PDF/A1b		No, owing to owner data (and land parcel numbers)
1.2	Real Estate Map (ALK)	Documentation of the real estate cadastre	A	Depends on Land; as far as feasible in technical terms			TIFF, EDBS		Yes
1.3	Real Estate Book (ALB)	Documentation of the real estate cadastre	A	Depends on Land; as far as feasible in technical terms				None	No
1.4	Official House Coordinates (HK-DE)	Based on 1.1 and 1.2	A			5 years (more frequent delivery on Land-specific basis)	ASCII		Yes
1.5	Official Building Polygons (HU-DE)	Based on 1.1 and 1.2; 2D building polygons	A			5 years (more frequent delivery on Land-specific basis)	Shape		Yes

Consecutive no.	Name	Origin, contents, function	Appraisal	Comments	Launch year	Interval	Submission form	Scale / raster size	Published
1.6	3D Building Models (LoD1-DE)		V / A	A if 1.7 not yet available			CityGML; shp		Yes
1.7	3D Building Models (LoD2-DE)		A	Replaces no. 1.6 if available for whole area		5 years (more frequent delivery on Land-specific basis)	CityGML; in BB: version 1.0		Yes
1.8	Real estate valuation (BRW, AKS)		B	Land-based solution since not an AdV product					Yes for BRW, no for AKS
2	**Digital Landscape Models**								
2.1	Basis-DLM	Object-structured vector database before migration	B				EDBS	1: 10,000	Yes
2.2	ATKIS Basis-DLM	Object-structured vector database after migration	A		2015	5 years	XML format portioned (at archive's request) in the form of complete NBA basic configuration		Yes
2.3	ATKIS DLM50	Model generalisation from Basis-DLM	V	Discontinued				1: 50,000	Yes

Consecutive no.	Name	Origin, contents, function	Appraisal	Comments	Launch year	Interval	Submission form	Scale / raster size	Published
2.4	DLM250 (BKG)			Responsibility of German Federal Archives				1: 250,000	Yes
2.5	DLM1000 (BKG)			Responsibility of German Federal Archives				1: 1,000,000	Yes
3	**Digital Terrain Models**								
3.1	DGM1	Digital, numerical model of the terrain heights and shapes of the earth's surface reduced to a regular grid	A	The highest resolution version per Land	2010	10 years	ASCII	1m	Yes
3.2	DGM2	Digital, numerical model of the terrain heights and shapes of the earth's surface reduced to a regular grid	A V	The highest resolution version per Land	2010	10 years	ASCII	2m	Yes Yes
3.3	DGM5	Digital, numerical model of the terrain heights and shapes of the earth's surface reduced to a regular grid	A V V	The highest resolution version per Land	2010	10 years	ASCII	5m	Yes Yes Yes
3.4	DGM10	Digital, numerical model of the terrain heights and shapes of the earth's surface reduced to a	A V	The highest resolution version per Land	2010	10 years	ASCII	10m	Yes
3.5	DGM25							25	Yes

3.6	DGM50	regular grid	V V					50m	Yes Yes
Consecutive no.	**Name**	**Origin, contents, function**	**Appraisal**	**Comments**	**Launch year**	**Interval**	**Submission form**	**Scale / raster size**	**Published**
3.7	DLM200 (BKG)			Responsibility of German Federal Archives				200m	Yes
3.8	DGM1000 (BKG)			Responsibility of German Federal Archives				1000m	Yes
4	**Digital Topographic Maps**								
4.1	DTK10 – colour edition		A	If available		Every 5 years	TIFF LZW + World File	1: 10,000	Yes
4.2	DTK25 – colour edition		A		2015	Every 5 years	TIFF LZW + World File	1: 25,000	Yes
4.3	DTK50 – colour edition		A			Every 5 years	TIFF LZW + World File	1: 50,000	Yes
4.4	DTK100 – colour edition		A			Every 5 years	TIFF LZW + World File	1: 100,000	Yes
4.5	DTK250 – colour edition (BKG)			Responsibility of German Federal Archives					Yes
4.6	DTK1000 – colour edition (BKG)			Responsibility of German Federal Archives					Yes

4.7	DTK10-V – colour edition		A	If available		Discontinued; last update and further transfers on Land-specific basis	TIFF LZW + World File		Yes
Consecutive no.	**Name**	**Origin, contents, function**	**Appraisal**	**Comments**	**Launch year**	**Interval**	**Submission form**	**Scale / raster size**	**Published**
4.8	DTK25-V – colour edition		A			Discontinued; last update and further transfers on Land-specific basis	TIFF LZW + World File		Yes
4.9	DTK50-V – colour edition		A			Discontinued; last update and further transfers on Land-specific basis	TIFF LZW + World File		Yes

4.10	DTK100-V – colour edition		A			Discontinued; last update and further transfers on Land-specific basis	TIFF LZW + World File		Yes
Consecutive no.	**Name**	**Origin, contents, function**	**Appraisal**	**Comments**	**Launch year**	**Interval**	**Submission form**	**Scale / raster size**	**Published**
5	**Aerial image products**								
5.1	ATKIS-DOP20		A	Delivery in RGBI, since available, otherwise RGB (covering whole area)		10 years	JPEG2000 (lossless compression)		Yes
5.2	ATKIS-DOP40		A	The first flight (covering whole area), only as long as no higher resolution available		10 years	JPEG2000 (lossless compression)		Yes

6	**Nationally Standardised Control Point Field**	Geodetic Reference Network Points (GGP), 1st order elevation control points, 1st order gravity control points, SAPOS reference station points							
6.1	AFIS	Control point information system in AAA model	A		2020	20 years	NAS		Yes, except for "Underground Monuments" and historical point information (BB example: regulated in NivP decree)
Consecutive no.	**Name**	**Origin, contents, function**	**Appraisal**	**Comments**	**Launch year**	**Interval**	**Submission form**	**Scale / raster size**	**Published**
6.2	Position Control Points (LFP)	Before AAA model; coordinates	B	Land-specific solution	One-time				
6.3	Documentation of Position Control Points	Before AAA model; file for point with sketch	B	Land-specific solution	One-time				
6.4	Elevation Control Points (HFP)	Before AAA model; coordinates	B	Land-specific solution	One-time				
6.5	Documentation of Elevation Control Points	Before AAA model; file for point with sketch	B	Land-specific solution	One-time				
6.6	Gravity Control Points (SFP)	Before AAA model; coordinates	B	Land-specific solution	One-time				
6.7	Documentation of	Before AAA model; file for	B	Land-specific	One-time				

	Gravity Control Points	point with sketch		solution					

Appraisal codes:
A – Archive
B – Evaluate
V – Destroy
Precursor product

Example metadata records from Brandenburg

Metadata (ISO and INSPIRE-compliant)		ALKIS (complete) example	DTK10 2740-SW Blesendorf example
Bounding boxes of the resource	Marking		
	North latitude	53.56	53.2485
	East longitude	14.87	12.4151
	South latitude	51.36	53.1985
	West longitude	11.28	12.3317
	Selection of place		
	Inner area	Yes	Yes
Contact for resource	Publisher	LGB	LGB
Online info of resource	URL	http://geobroker.geobasis-bb.de among others	http://geobroker.geobasis-bb.de among others
	Function of URL	Ordering	Ordering
	Description		
Date specifications	Date	28.02.2013	28.02.2014 00:00:00
	Type	Creation	Revision
Temporal extent	Beginning		
	End		
	Description		
Edition and date of edition	Edition		
	Date of edition		
Reference system specifications	Reference system	EPSG 25833	EPSG 25833
	Description	ETRS89 system; 6 degree UTM projection zone 33N (GRS80 ellipsoid)	ETRS89 system; 6 degree UTM projection zone 33N (GRS80 ellipsoid)
Vertical extent	Highest point		
	Lowest point		

	Vertical reference system		
Metadata (ISO and INSPIRE-compliant)		**ALKIS (complete) example**	**DTK10 2740-SW Blesendorf example**
Origin	Origin	Information available from kundenservice@geobasis-bb.de	Information available from kundenservice@geobasis-bb.de
	Data sources		
	Production process		
Keyword information	Keyword	Cadastre, real estate, building, control points, etc.	1: 10,000, land cover, map, raster data
	Type	Theme	Theme
	Thesaurus	GEMET – INSPIRE themes, version 1.0	
Language and character set of the resource	Language	German (ger)	German (ger)
	Character set	uft8	uft8
Updating	Maintenance interval	Daily	Continual
	Update remarks		
	Next revision date		
	User-defined maintenance interval		
Spatial resolution and theme	Scale of comparison	1: 1000	1: 10000
	Ground or raster resolution		
	Theme	Planning records / real estate cadastre (planningCadastre)	Image data / base maps / earth cover (imageryBaseMapsEarthCover)
Spatial representation	Type of representation	Vector	Raster, grid
	Type of geometry		
	Number of objects		

	Topology level		
	Presentation form		
Quality report	Value and unit of absolute position accuracy		3.0 metres
	Value and unit of completeness	100%	48.0%
Metadata (ISO and INSPIRE-compliant)		**ALKIS (complete) example**	**DTK10 2740-SW Blesendorf example**
Purpose and revision	Purpose	Official digital documentation of real estate – legal certainty of ownership in connection with the land register (presumption of accuracy)	Provision of 1 :10,000 topographic map in raster format
	Revision	Ongoing updating (onGoing)	Ongoing updating (onGoing)
Sales – contact and information	Sales contact	LGB	LGB
	Costs	From €15.00 to €113,000 max.	6.00 euros per km², minimum order value of 15.00 euros
	Order information	All prices are subject to change; online orders can be made via geobroker	All prices are subject to change; online orders can be made via geobroker
	Delivery time	14 days delivery time by post; download after online processing	14 days delivery time by post; download after online processing
Sales – delivery formats	Name of data format		
	Version of data format		
	Specification of data format		
	Decompression method		
	ISBN		

Usage information	Conditions for access and use	http://www.geobasis-bb.de/GeoPortal1/pdf/AGNB.pdf	http://www.geobasis-bb.de/GeoPortal1/pdf/AGNB.pdf
	Restrictions to public access	Other restrictions (otherRestrictions): Reproductions, sales and publications of any kind are only permissible by purchasing additional rights of use.	Other restrictions (otherRestrictions): Reproductions, sales and publications of any kind are only permissible by purchasing additional rights of use.
		Security restrictions	
Metadata (ISO and INSPIRE-compliant)		**ALKIS (complete) example**	**DTK10 2740-SW Blesendorf example**
General information	Alternative title	ALKIS-NBA	DTK10_2740-SW_Blesendorf
	Contact (metadata)	LGB	LGB
	Metadata record identifier	47772c8e-8145-4cbc-9344-c229887722e4	d550ae2e-0c29-4387-b5c6-8f7a34caa598
	Parent metadata record identifier		84579219-6849-4c89-90d0-aa7db3f26fa8
	Name of hierarchy level	Geographic reference data/services of LGB	Geographic reference data/services of LGB
	Language (metadata)	German (ger)	German (ger)
	Date/version (metadata)	02.10.2014 10:03	25.11.2014 16:43:26
	Character set (metadata)	utf8	utf8
	Name of metadata standard	ISO 19115:2003/Cor 1:2006, 19119:2005/Amd 1:2008 (BE/BB)	ISO 19115:2003/Cor 1:2006, 19119:2005/Amd 1:2008 (BE/BB)
	Version of metadata standard	2.1.0	2.1.0
	Resource identifier	LGB#47772c8e-8145-4cbc-9344-c229887722e4	LGB#d550ae2e-0c29-4387-b5c6-8f7a34caa598

All information taken from Geoportal Brandenburg.

Information on data volumes in various Laender (Land coverage)						
Consecutive no.	**Name**	**SH data volume (not compressed)**	**TH data volume (not compressed)**	**BW data volume (not compressed)**	**BB data volume**	**RLP data volume**
1	**Real Estate Cadastre**					
1.1	ALKIS	94.5 GB	350 GB (filed according to cadastral districts)	DHK: 310 GB (excluding towns with their own real estate cadastre) APK: approx. 1 TB	.gz compressed: 4-5 GB	Compressed approx. 9 GB
1.2	Real Estate Map (ALK)		14.3 GB	31.5 GB		Approx. 25 GB max.
1.3	Real Estate Book (ALB)		0.85 GB	10.6 GB		Compressed 600 MB
1.4	Official House Coordinates (HK-DE)	100 MB	0.07 GB	0.55 GB		
1.5	Official Building Polygons (HU-DE)	1.2 GB	0.5 GB	2.5 GB (format: Shape)	400 MB (Shp)	
1.6	3D Building Models (LoD1-DE)	25 GB	14 GB	50 GB		
1.7	3D Building Models (LoD2-DE)	Under development	Under development	100 GB	Under development	
2	**Digital Landscape Models**					
2.1	Basis-DLM		1.7 GB			
2.2	ATKIS Basis-DLM	5.8 GB	8.1 GB	30 GB	.gz compressed: 500 MB	
2.3	ATKIS DLM50		3.3 GB	14 GB		
3	**Digital Terrain Models**					

3.1	DGM1	670 GB (ASCII)	-	1 TB		Approx. 1 TB
Consecutive no.	**Name**	**SH data volume (not compressed)**	**TH data volume (not compressed)**	**BW data volume (not compressed)**	**BB data volume**	**RLP data volume**
3.2	DGM2	Derivation from DGM1	490 GB (1m raster size)	Derivation from DGM1		
3.3	DGM5		Derivation from DGM2		13 GB (ASCII)	Approx. 50 GB
3.4	DGM10					
3.5	DGM25					
3.6	DGM50					
4	**Digital Topographic Maps**					
	DTK5	35 GB	-	-		
4.1	DTK10 – colour edition		4.5 GB (8.1 GB with individual layers)	DTK total: approx. 40 GB	LZW compressed: 4.4 GB	
4.2	DTK25 – colour edition	1.6 GB	1.6 GB (2.8 GB with individual layers)		LZW compressed: 1.2 GB	Approx. 1.5 GB
4.3	DTK50 – colour edition	640 MB	0.61 GB (0.91 GB with individual layers)		LZW compressed: 455 MB	Approx. 0.9–1.0 GB
4.4	DTK100 – colour edition	100 MB	0.26 GB (0.366 GB with individual layers)		LZW compressed: 165 MB	Approx. 250 MB
5	**Aerial image products**					
5.1	ATKIS-DOP20	1.5 TB	1.7 TB	4 TB	Uncompressed: 1.5–2.1 TB	Uncompressed: 1.5–2.0 TB
5.2	ATKIS-DOP40	400 GB	430 GB	1 TB (derivation from DOP20)	Uncompressed: 220 GB	
6	**Nationally Standardised Control Point Field**					
6.1	AFIS			2 GB Control point sketches		

				20 GB		
	Other products					
	ATKIS-DOP20 historical	7.5 TB	-	Approx. 9.5 TB (25 cm resolution)		
	ATKIS-DOP40 historical	2.5 TB	-		Uncompressed: 220 GB	
	ATKIS-DOP10			16 TB		

Members of the working group

Head of the working group:

Mr Killiches – BB Landesvermessung und Geobasisinformation Brandenburg *as representative of the Geographic Reference Steering Committee (LA)*

Surveying and mapping	**Archive**
Mr Osterhold – TH Landesamt für Vermessung und Geoinformation –Abt. 3 – Landesvermessung und Geoservice *as member of Geotopography Working Group (AK GT)*	Ms Kotte – HH Freie und Hansestadt Hamburg – Kulturbehörde, Staatsarchiv
Mr Näser, Mr Riedel, Mr Klenner – SN Staatsbetrieb Geobasisinformation und Vermessung Sachsen – Abt. 3 Liegenschaftskataster	Dr Grau – BY Generaldirektion der Staatlichen Archive Bayerns
Mr Grams – BW Ministerium für Ländlichen Raum und Verbraucherschutz Baden-Württemberg – Referat 43	Dr Naumann – BW Landesarchiv Baden-Württemberg – Abt. Staatsarchiv Ludwigsburg
Dr Seyfert – BB Landesvermessung und Geobasisinformation Brandenburg – Fachbereich 3	Ms Stahlberg – BB Brandenburgisches Landeshauptarchiv
Mr Magg – SH Landesamt für Vermessung und Geoinformation Schleswig-Holstein – Abt. 6 *as representative of Real Estate Cadastre Working Group (AK LK)*	Dr Schmidt – NW Landesarchiv Nordrhein-Westfalen – Fachbereich Grundsätze

Head of the administrative office: Ms Rein

Mr Stolz – BY (guest) Landesamt für Digitalisierung, Breitband und Vermessung Bayern