



## Archaeology and Information Systems

Today's boundaries often cut through culturally homogenous landscapes of the past. That's why archaeological research cannot stop at state borders and also heritage protection benefits from cross border views. Because every state of Germany is culturally independent, we find a very differentiated situation of data models for archaeological information. So the exchange of archaeological information within Germany and externally is not easy at all.

Authorities of archaeological heritage protection are more and more required to open their data to the public. Initiatives like INSPIRE and GDI-DE aim at improved and smooth information exchange. Currently, many organizational and technical standards and specifications are developed in this context, and these will be binding to public administration. The list of topics, that have to be implemented first, includes for instance "protected sites".

Therefore the commission "Archaeology and Information Systems" of the Association of State Archaeologists of Germany (Verband der Landesarchäologen) is concerned with conceptual, technical, economical and legal problems, with the aim to reconcile cultural heritage protection with increasing demands by the public. The commission is a platform to exchange knowledge and experiences. Special teams work on recommendations to harmonize and standardize archaeological data models, on solutions to archive digital archaeological data and on legal aspects of geodata. Benefits can be expected in the fields of monument protection, research, public relations and tourism.

The modeling team began its work with the examination and comparison of the existing data models and international standards (CIDOC-CRM, Object-ID). The situation was very heterogeneous, especially terms like "Fundstelle" or "Fundplatz" (possibly: find spot, find location) were not used consistently. Therefore the neutral term "Fläche" (area) was defined (which includes points and linear objects), along with three narrower terms: "Archäologiefäche" (archaeological area), "Untersuchungsfläche" (investigation area) and "Schutzfläche" (protected area).

The comparison of existing data models in different German states led to a very simple initial model for the description of archaeological areas, consisting of the modules "general", "georeference" and "type and period". The new model includes the most important fields present in all data models considered, but does not replace the existing data models. Instead it serves as an exchange format and supports a unique view across several models.

This model combined with information on its technical realization constitutes the first version of the Archaeological Data eXport standard ADeX. This version is very easy to use and can be implemented without significant programming effort.

Within the first three years of its activity, the commission "Archaeology and Information Systems" achieved important results. Several papers (types of areas, coordinate reference systems, precision of coordinates) were created, moreover the second ADeX version (ADeX 1.2) was defined and published on the web. ADeX is a registered trademark and is listed as reference information on the INSPIRE web site of the European Commission.

In 2007 the workshop "Data Exchange of the Heritage Service in Germany" was organized at the conference "Cultural Heritage and New Technologies" in Vienna. At the same time the internet site of the commission "Archaeology and Information Systems" went online (see URL below).

A harmonized view on archaeological data of overall Germany may be reality soon, if as many archaeological institutions as possible support ADeX. That would be profitable to research as well as to heritage preservation.

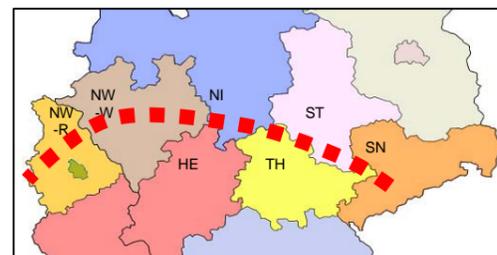


Figure 1: Cross border construction project (natural gas pipeline Sayda-Werne-Eynatten) and data models involved.

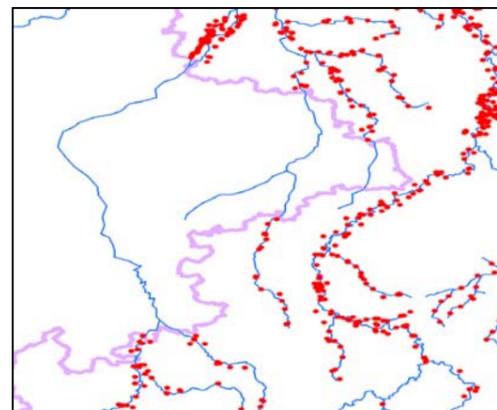


Figure 2: Distribution of find spots next to streams with data from only one of two neighboring German states.



## Standard of Archaeological Data eXport

The development of the Archaeological Data eXport standard (ADeX) was initiated by the commission "Archaeology and Information Systems" of the Association of State Archaeologists in Germany and was implemented by its modeling team. The aim is to develop a simple standard for exchanging archaeological data between all relevant institutions throughout Germany and to export archaeological data to third parties.

An archaeological exchange format is needed to ensure that heritage protection is not limited by borders. Archaeological research can also take advantage of a standardized exchange format.

Terms like "Fundstelle" (find spot) or "Fundplatz" (find location) are not consistently defined. Therefore the neutral term **area** is introduced to describe locations of archaeological relevance. The term **area** also includes lines or points which often represent imprecisely located sites.

Three kinds of **areas** were defined:

- **Archaeological areas** are areas, where at least one relevant archaeological result is present or is assumed.
- **Investigation areas** are areas, that were surveyed or investigated by archaeological means.
- **Protected areas** are areas, that are legally protected for archaeological reasons or are prepared for this.

As a result of extensive analysis of data structures used in various archaeological institutions, a core set of attributes was chosen and integrated into the first ADeX version.

### ADeX Version One

The first version of ADeX is intentionally simple and contains only a small number of essential attributes. Its focus is on **archaeological areas**, and in version 1.1 and 1.2 the areas are represented by center points and bounding boxes. The standard consists of two tables in CSV format:

#### Data table

The **data table** consists of one dataset per **archaeological area**. There are three groups of attributes (modules):

- **General**, e.g. ADeX identifier, responsible institution, kind of area, data source, authorization information.
- **Georeference**, e.g. coordinates, reference system, precision, municipality.
- **Type and dating**. Broader terms from a list of approved terms are used to describe the type and the dating. Narrower terms are not standardized and depend on the different thesauri of the institution providing the data.

A standardization of the narrower terms is necessary for some investigations. Unfortunately this problem is not yet solved. But ADeX supports a single set of broader terms at least at overview level.

#### Explanation table

The **explanation table** contains a list of terms and their explanations. Each term used within a field of the **data table** can be annotated in the **explanation table**. To identify a term uniquely, the fields institution, attribute name, and term are included in the **explanation table**.

### Sample data

**Data table** (all data is fictive):

general:											georeference:		
ADEX_ID	BEZEICHUNG	FLAECH_ART	ERFASS_DAT	AENDER_DAT	ANSPRECHP	DAT_QUELLE	BERECHTIG	COPYRIGHT	ZUSATZ	KOO_REFSYS	X_KOORD	Y_KOORD	
NI_111111.0001-F	Dammburg	Archäologiefäche	1989		Müller	ADABweb	Weitergabe nur mit Genehmigung NLD	NLD		31467	3610000	5840000	
SN_11110-D-01-1	Sachsenburg	Archäologiefäche			Meier	DIA	lt. Nutzungsvereinb.	LfA Sachsen		31468	4570000	5640000	
RH_OVP 2001/0111	Junckersburg	Archäologiefäche	2008-11-13	2009-04-28	Schulze	ZADAB-Platz-Modul	ADeX-Test	LVR/RAB		31466	2590000	5660000	

more georeference:

type/dating:												
X_VON	Y_VON	X_BIS	Y_BIS	GENAUIGK	GENAUIGK_T	GDE_KENN	GDE_NAME	TYP_FEIN	TYP_ERLAEU	DAT_GROB	DAT_FEIN	DAT_ERLAEU
3609990	5839990	3610010	5840010	10	5 - 20 m	3151019	Obernholz	Siedlung/Befestigung/Produktion	Burg	Mittelalter	11. Jh.	
				25			Frankenberg	Siedlung/Befestigung/Produktion	Burg	Mittelalter	Mittelalter	
2589990	5659990	2590010	5660010	20	20m schätzbar	5378012	Kürten	Siedlung/Befestigung/Produktion	Burg	Mittelalter/Neuzeit	MA - NZ	

**Data table as CSV:**

```
ADEX_ID | BEZEICHUNG | FLAECH_ART | ERFASS_DAT | AENDER_DAT | ANSPRECHP | DAT_QUELLE | BERECHTIG | COPYRIGHT | ZUSATZ | KOO_REFSYS | X_KOORD | Y_KOORD | X_VON | Y_VON | X_BIS | Y_BIS | GENAUIGK | GENAUIGK_T | GDE_KENN | GDE_NAME | TYP_FEIN | TYP_ERLAEU | DAT_GROB | DAT_FEIN | DAT_ERLAEU
NI_111111.0001-F | Dammburg | Archäologiefäche | 1989 | | Müller | ADABweb | Weitergabe nur mit Genehmigung NLD | NLD | | 31467 | 3610000 | 5840000 | 3609990 | 5839990 | 3610010 | 5840010 | 10 | 5 - 20 m | 3151019 | Oberholz | Siedlung/Befestigung/Produktion | Burg | Mittelalter | Hochmittelalter (11. Jh.) |
SN_11110-D-01-1 | Sachsenburg | Archäologiefäche | | | Meier | DIA | lt. Nutzungsvereinb. | LfA Sachsen | | 31468 | 4570000 | 5640000 | | | | | | | | | | | | | | | |
RH_OVP 2001/0111 | Junckersburg | Archäologiefäche | 2008-11-13 | 2009-04-28 | Schulze | ZADAB-Platz-Modul | ADeX-Test | LVR/RAB | | 31466 | 2590000 | 5660000 | 2589990 | 5659990 | 2590010 | 5660010 | 20 | 20m schätzbar | 5378012 | Kürten | Siedlung/Befestigung/Produktion | Burg | Mittelalter/Neuzeit | MA - NZ |
```

**Explanation Table:**

INST	FELD	BEGRIFF	ERKLAER
NI	ANSPRECHP	Müller	Max Müller, Musterinstitut für Archäologie
SN	KOO_REFSYS	31468	RD83 (DHDN-Sachsen), Gauß-Krüger-Projektion 4. Streifen
RH	BERECHTIG	ADeX-Test	Testdaten. Nutzung nur im zur ADeX-Präsentation erlaubt.

**Explanation Table as CSV:**

```
INST | FELD | BEGRIFF | ERKLAER
NI | ANSPRECHP | Müller | Max Müller, Musterinstitut für Archäologie
SN | KOO_REFSYS | 31468 | RD83 (DHDN-Sachsen), Gauß-Krüger-Projektion 4. Streifen
RH | BERECHTIG | ADeX-Test | Testdaten. Nutzung nur zur ADeX-Präsentation erlaubt
```

As a test case data of the type "castle" from several archaeological institutions were assembled. The result is a map of castles supplied by the "ADeX pioneers": Niedersachsen, Rheinland, Rheinland-Pfalz, Sachsen, Sachsen-Anhalt, Schleswig-Holstein and Thüringen. Furthermore an article on the distribution of linear pottery culture and many bilateral projects used ADeX data from several institutions.

The ADeX standard will be further enhanced. Next steps are to include linear and areal objects into the georeference module and to design and integrate a new module "protection" for the exchange of information on protected areas (archaeological monuments).

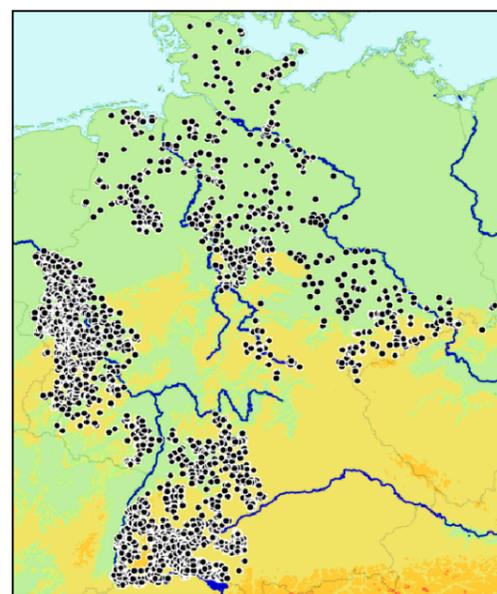


Figure 3: Map of German castle sites from the "ADeX Pioneers".

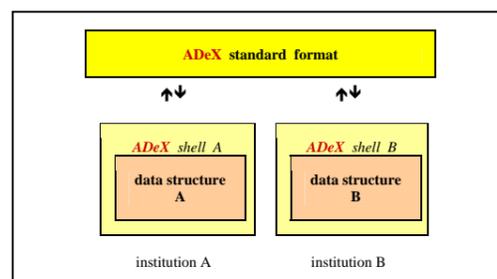


Figure 4: The ADeX shell is creating a new unique view on archaeological information coming from different sources.



Figure 5: Vision of ADeX proliferation.