

Beyond administrative boundaries

Archaeological research networks

Armin VOLKMANN

Cluster of Excellence "Asia and Europe in a Global Context", Heidelberg University

Abstract: Digital data infrastructures for the arts and humanities are currently being developed within the framework of various projects in Europe. Among these projects, DARIAH (Digital Research Infrastructure for the Arts and Humanities) is one of the largest projects, and it is designed as a long-term project. DARIAH focuses primarily on philology and history, but it is in a broader sense also open to other disciplines. DARIAH is for example conceptualizing a data infrastructure for archeology. The cooperation with other infrastructure projects is a key component in the architecture of the digital data infrastructure for archaeologists. Within the network of the different data infrastructure projects, DARIAH could be aimed to harmonize the national activities on the EU level. International archaeological data networks are desirable in related regions such as the Franco-German upper Rhine region (with the project TOPAMA) in order to go beyond existing administrative boundaries of research.

So what are the specific needs of archaeologists within a digital research data infrastructure? Is it even possible to implement a centralized research data infrastructure (that would be accepted by the researchers) in the very heterogeneous landscape of archaeological sciences in Europe? In order to answer this question it seems essential to involve as many partners as possible in the conception of the infrastructure right from the beginning of the project. E.g. the structure of federal states in Germany did not enable the foundation of a national archaeological data service, such as in the Netherlands or the UK. The political conditions are contrary to centralized efforts. Thus, a decentralized architecture of the data infrastructure represents a potential solution to the existing problem. A comparable infrastructure would make the respective databases mutually accessible for all partners. Furthermore could the DARIAH service provide a long-term binary data storage with sovereign rights of data privacy and security requirements.

Keywords: Digital research infrastructure for archaeology, archaeological networks, archaeological research in Europe without administrative boundaries, archaeological databases, data access

State archaeology within the federal structure of Germany

Preservation of archaeological monuments in the Federal Republic of Germany is subject to the authority of individual states. As a result of the federated state structure there are 16 largely independent state offices for the preservation of monuments or state offices for archaeology in Germany. This in turn results that archaeological research across the established administrative boundaries of the individual states has been and is undertaken only very rarely. For quantitative research approaches however this is very problematic because the spatial distribution of different finds and features is naturally not limited to this arbitrary administrative framework. In order to overcome these existing research boundaries, a new collaboration

agreement must be negotiated every time between all relevant state archaeological authorities for each specific research project. As this is quite complex it is often inevitably abandoned and there arise again and again isolated surveys of limited significance. The problem is also beyond that of data reconciliation of the databases of the archaeological authorities: at present there exists no nationwide common standard for the definition and design of databases in Germany.

The databases of individual states are heterogeneous both in format as well as design, so that interoperability is not possible.¹ The Association of State Archaeologists of the Federal Republic of Germany (Verband der Landesarchäologen in der Bundesrepublik Deutschland) endeavored to remedy this several years ago which lead to the development of a common format, the ADeX Standard, for data exchange.² These pioneering database standards could however only be applied very rarely as the archaeological authorities can only use funds for their respective administrative areas (and not inter-regionally), but there is an urgent need for the consistent application of the ADeX Standard for a data exchange across state borders. It is therefore very desirable to develop new perspectives which make archaeological data better accessible for research. Furthermore different coordinates systems are also used in each state which, even after the complex normalization of correlated databases from different states, do not enable a simple projection of site mapping as the coordinates must first be translated into an inter-regional, ideally international, coordinates system.³

Therefore with the current state of affairs neither can the archaeological data of a specific area be queried across borders nor can these data be brought together from an inter-regional area of investigation for mapping in a geographic information system (GIS) without very elaborate preparation for normalization. Although there is a geo-service with respective geo-browser available online for each state they are however not compatible with one another for inter-regional studies. In rare exceptions reference data can be implemented in an independent GIS by individual states if they are available online as a Web Map Service (WMS) of the archaeological authority and translated into an international coordinates system.⁴ Even this first step is unfortunately still the exception and not the rule.⁵

¹ C. Binding/K. May/D. Tudhope, Semantic Interoperability in Archaeological Datasets: Data Mapping and Extraction via the CIDOC CRM. http://hypermedia.research.glam.ac.uk/media/files/documents/2008-07-05/binding_ECDL2008.pdf

E.-C. Kansa/ S. Whitcher Kansa/ E. Watrall (ed.) A web of Archaeological Data: Infrastructure, Services, and Interoperability. ARCHAEOLOGY 2.0 - New approaches to communication & collaboration. <http://www.escholarship.org/uc/item/1r6137tb>

² Commission for Archaeology and Information Systems – ADeX (in German): <http://www.landesarchaeologen.de/verband/kommissionen/archaeologie-und-informationssysteme/projektarbeitsgruppen/adex/>

³ For example WGS 84 with EPSG (European Petroleum Survey Group) Code 4326. <http://www.epsg.org/> <http://www.epsg-registry.org/>

⁴ This is possible at the Bavarian State Office for Preservation of Monuments with the "Bavarian Atlas" which also permits the implementation of a WMS of the monument space in a local GIS. Additional archaeological data however cannot be queried (sources in German). http://vermessung.bayern.de/file/pdf/1484/Kundeninformation_08_03.pdf



Fig. 1 – Online archaeological database of the Museum of Westlausitz in Kamenz eastern part of Saxony (Germany)
http://sammelsurium-westlausitz.de/fmi/iwp/res/iwp_home.html

Currently there exists in Germany only one online archaeological database for an administrative region. This is the finding-places and finds database of the Museum of Westlausitz in Kamenz in the eastern part of Saxony and which provides access to the archaeological information of this region (fig. 1).⁶ This online portal is however still more of an experimental nature as both the server speeds and database design and format are primarily oriented to the needs of the regional museum. Nevertheless this is a seminal development which not only allows a query of the archaeological data of the site but also reveals significant finds to the user through high-quality photographs and drawings.

<http://geoportal.bayern.de/geoportalbayern/inhalte/uebersichten/geodatendienste.html>

<http://geoportal.bayern.de/bayernatlas/>

⁵ In the Spatial Data Infrastructure of Germany (GDI-DE), an enterprise of federal, state, and local authorities, spatial data (geo-data) are provided online and networked via the internet in geo-browsers, geo-portals, or web-GIS. A consolidated geo-portal is the entrance to the GDI-DE in order to search for, find, and use federal, state, and local geo-data, and to incorporate them into additional data networks (such as those for archaeology).

⁶ (In German) http://sammelsurium-westlausitz.de/fmi/iwp/res/iwp_home.html

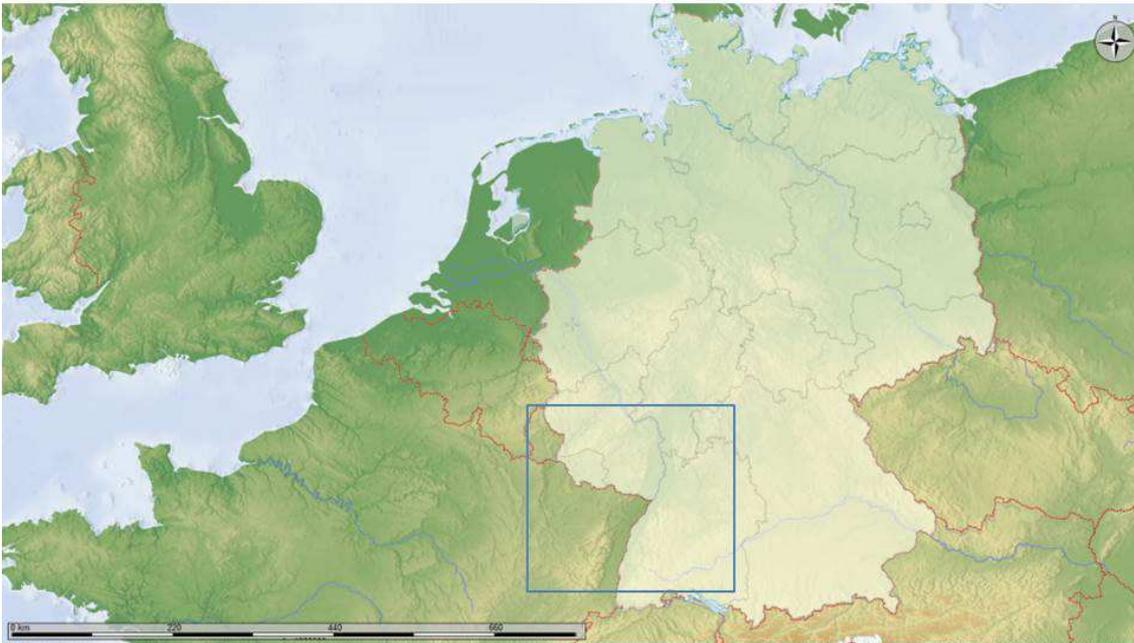


Fig. 2 – The project TOPAMA (Topography of antiquity and the Middle Ages - A web-based information and analysis system for the history of Europe) is being conducted by the University of Heidelberg, Goethe University Frankfurt and Pantheon-Sorbonne University (Paris 1): Test region in the Franco-German upper Rhine region with the archaeological data of west France, Luxembourg and southwest Germany (with federated states: Rheinland-Pfalz, Saarland, Baden-Württemberg, Hessen und Bayern) in seven archives largely independent state offices for the preservation of monuments or state offices for archaeology.

Decentralized data access in inter-regional research networks

The aforementioned federal structure of the Federal Republic of Germany stands therefore basically in opposition to the initiation of a statewide or even national archaeological database as exists, for example, in the Netherlands or Denmark. The solution to the problem could therefore consist of the design and implementation of decentralized data access combined in a portal. The access to the individual archaeological authorities could thus take place via the research platform of a portal which occupies a mediary function between the interests of the authorities and those of research. In this way research questions on a specific region could be posed, and users registered by logging in. An administrative allocation of rights should allow for different forms of data usage. The individual queries should then be forwarded in the portal to the archaeological authority which would then subsequently enable a database query of their holdings. As the query for a research area is usually related to various administrative regions, parallel queries would have to be posed through the portal to the relevant finds databases of the respective archaeological authorities. Ultimately these individual queries would be collected in the portal and there be available for download by the user.

The concept of utterly freely available archaeological data also has limits which must be considered: specific archaeological information, such as exact site coordinates, should not be generally accessible in order to prevent illegal excavations and associated destruction or the plundering of sites. It therefore seems particularly important to also make a download of the data available to the participating partners of the archaeological authorities so that one can also differentiate between registered research users and unregistered general users. Researchers require uninhibited access to all results for the data analysis, including exact coordinates, for example for projection in their own GIS. The general public should also receive as much information on archaeological finds as possible although the problem of illegal excavations is very real and not to be underestimated in order to also protect and preserve the future of sites. For the general public one could use for example larger and less precise map symbols in a geo-browser for archaeological site data, ones which would cover a larger area, so that actual discovery would be more difficult in reality.

Recently the EU Directive “Public Sector Information (PSI)”,⁷ which is responsible for the disclosure and use of all data created with public funds, has led controversial discussions in museums and archives. The current statement of the German Library Association and the Association of State Archaeologists of Germany illustrate this.⁸ While many museums and archives are indeed financed with public funds often this is only partially and additional sources of revenue are urgently needed for their continued operation. Due to their limited financial resources many museums and archives are often not able to forego the income from user fees for data. One must also develop regulatory perspectives for the handling of research data in the context of a data network which simultaneously consider the needs of museums and archives as well as enable the greatest possible availability of or access to data, at least for purposes of research or licensed researchers. In Denmark all national databases of archaeological sites are already freely available for scientific purposes, which could serve as an example.⁹

⁷ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:345:0096:EN:PDF>

⁸ (In German) <http://www.landesarchaeologen.de/verband/empfehlungenresolutionen/>

⁹ (In Danish) <http://www.kulturarv.dk/fundogfortidsminder/Download/>

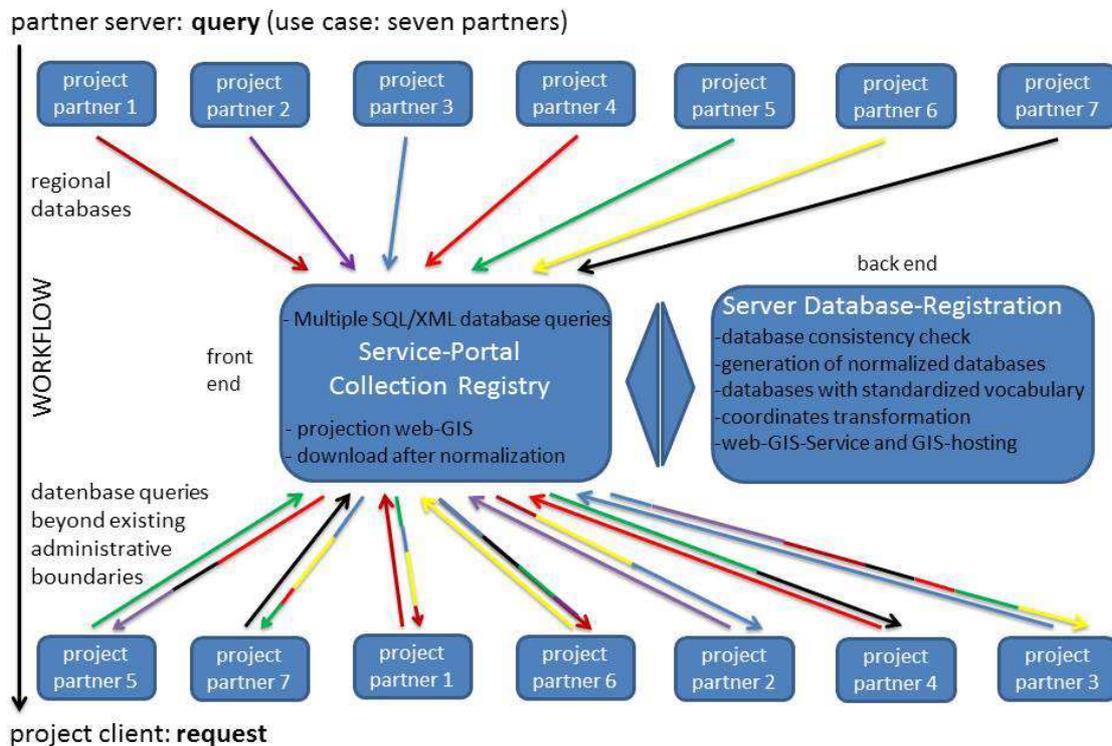


Fig. 3 – TOPAMA project architecture: Decentralized data access in inter-regional research networks of archaeological data.

The construction of a virtual research data infrastructure for archaeology however should not be the construction of a new project platform to compete with preexisting and ongoing projects¹⁰ but instead serve

¹⁰ For example the project IANUS, a research data center for archaeology and ancient studies of the German Archaeological Institute (DAI), may be mentioned here. http://www.ianus-fdz.de/projects/zentr-dig-arch/wiki/Vorarbeiten_DAI (in German).

The project CARARE/Europeana is also working since a while on “GIS services and archaeology-architecture site data” <http://www.carare.eu/eng/Resources> <http://www.carare.eu/>

H.-J. Hansen/K. Fernie, CARARE - Connecting Archaeology and Architecture in Europeana

http://www.researchgate.net/publication/221197098_CARARE_Connecting_Archaeology_and_Architecture_in_Europeana/file/e0b495190e8739eb0a.pdf

“The primary mission of the Europae Archaeologiae Consilium (EAC) is to support the management of the archaeological heritage throughout Europe and to serve the needs of national archaeological heritage management agencies by providing a forum for organizations to establish closer and more structured co-operation and exchange of information”, see project ARCHES (Archaeological Resources in Cultural Heritage a European Standard) <http://www.european-archaeological-council.org/13-0-Archives.html>, P.-A.-C. Schut (ed.) Listing Archaeological Sites, Protecting the Historical Landscape

<http://www.archaeolingua.hu/books/eac/eac%2003.html>

to advise and support on the points of data structure, data standards, data archiving/long-term archiving, and web-GIS and should address the implementation of the EU Directive INSPIRE targeted towards an integrated portal.¹¹

Therefore, the project TOPAMA (“Topography of Antiquity and the Middle Ages. A web-based information and analysis system for the history of Europe 0-1500 AD”) is a use case in order to bring together heterogeneous data for the specific needs of archaeologists and historians in a test area of Central Europe (fig. 2), and it is developing a tangible research infrastructure.¹² Regarding Antiquity and the Middle Ages, historians and archaeologists are short of maps: Indeed, sources are unclear, but the full potential of cartographic representations has not been reached yet, especially since the potential was increased by new digital technologies. It is in this perspective that the project TOPAMA will develop an online Geographic Information System for the European field (0-1500 AD.). This will provide a tool not only for location, but also for analysis by superimposing data and by processing geomatics. This project will also repair some of the gaps between medievalists and specialists of the Antiquity, between historians and archaeologists, between the French and Germans. It is planned to map the archaeological finds, bishoprics, monasteries and palaces, as well as lexical uses by a geolocation of texts. This list of items will be the basis for a pilot project, but it is designed to be open for other objects thereafter. The project is characterized by the usage of open access and interoperable formats. To collect the necessary data, participants will provide original research, but also gather the results of existing databases through a decentralized data structure (fig. 3-4). For this

“The European Association of Archaeologists (EAA) is a fully democratic body which consists of various boards and committees whose members are chosen through an annual election process”, e.g. Working Parties “Terms of Reference for the Working Party on Archaeological Archives and Collections in Europe” and “ArchaeoLandscapes Europe” http://www.e-a-a.org/working_groups.htm

¹¹ INSPIRE: Infrastructure for Spatial Information in the European Community.
http://europa.eu/legislation_summaries/environment/general_provisions/l28195_en.htm

“The Institute for Archaeologists (IfA) has also developed a range of Codes, Standards and Guidelines in the United Kingdom”, e.g. IfA Standard and guidance for archaeological advice and procurement of archaeological services. <http://www.archaeologists.net/codes/ifa>

Opinions and recommendations of the Association of State Archaeologists in the Federal Republic of Germany (Verband der Landesarchäologen in der Bundesrepublik Deutschland): Guidelines for archaeological monuments in Germany (Leitlinien zur archäologischen Denkmalpflege in Deutschland) and Standards for excavations and prospecting of performing and documenting (Standards für Ausgrabungen und Prospektion zur Durchführung und Dokumentation) <http://www.landesarchaeologen.de/verband/empfehlungenresolutionen/> (in German).

ARIADNE (Advanced Research Infrastructure for Archaeological Dataset Networking in Europe) is a project that “brings together and integrates existing archaeological research data infrastructures so that researchers can use the various distributed datasets and new and powerful technologies as an integral component of the archaeological research methodology. The project will enable trans-national access of researchers to data centres, tools and guidance, and the creation of new web-based services based on common interfaces to data repositories, availability of reference datasets and usage of innovative technologies.” <http://www.ariadne-infrastructure.eu/About/Introduction>

¹² The project TOPAMA is being conducted by the University of Heidelberg, Goethe University Frankfurt, Université Paris-1 Panthéon-Sorbonne, supported by DARIAH-DE, and co-operating with the French project ArkeoGIS (with a portal in French and German) at Université de Strasbourg. <http://arkeogis.org/>

purpose, the project is favored by a large number of partner institutions. E.g. TOPAMA is working with the Archaeological Information System OpenAtlas, which is developed at Vienna University.¹³

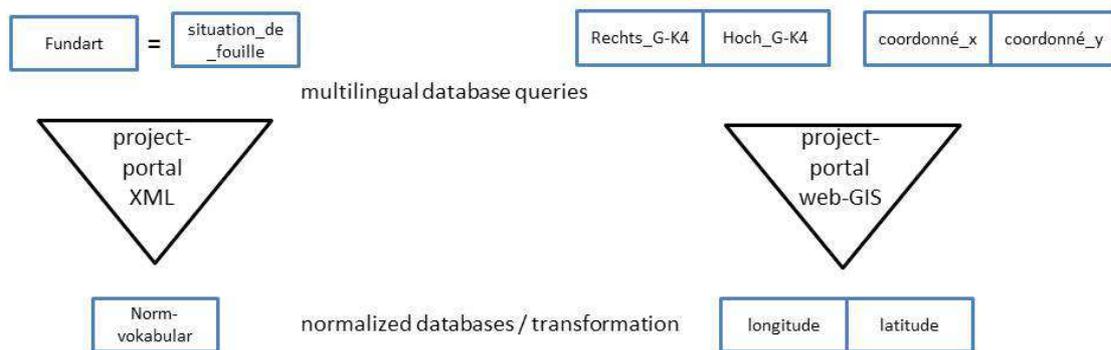


Fig. 4 – TOPAMA multilingual database interoperability for heterogeneous databases. A solution of generation for normalized databases: German-French standardized vocabulary with cross-concordances for standardized database queries.

The role of DARIAH (Digital Research Infrastructure for the Arts and Humanities)

The European project DARIAH-EU now targets itself strategically to the consolidation phase. Thus far the textual and historical sciences are particularly well represented and involved in this project network. The German division (DARIAH-DE) has in the consortium in addition to the humanities above all specialists in archiving (libraries), IT and long-term archiving of data centers, but also from archaeology.¹⁴ Thus could the existing problem of how individual states currently function and the unavailability of archaeological site databases be targeted. In a test region, the Franco-German upper Rhine region, the archaeological data of east France and southwest Germany can now be consolidated to this effect within the partner project TOPAMA in a web GIS portal (fig. 2-4). Through corresponding partners in historical and medieval studies

¹³ (In German) <http://www.openatlas.eu/>

¹⁴ (In German) <http://de.dariah.eu/>

data has already been input to this project network from written sources. Through the EU partner institutions from DARIAH this perspective could also be addressed in the context of additional European landscapes, such as the North Sea, in similar collaborative data networks.¹⁵ The individual national databases can be made more scientifically accessible via the DARIAH Collection Registry, a collection of collections. The data ownership would simultaneously be retained by the respective national archaeological authorities as the data would remain on their local servers rather than being saved on project servers. Within the DARIAH-EU project consortium these efforts will be particularly well implemented on the EU-level in Virtual Competency Centres (VCC) in which, in addition to the Collection Registry, the different aspirations of individual regional projects in the European context could be harmonized and standards for databases and metadata could be developed interdisciplinarily.

Imprint:

Proceedings of the 18th International Conference on Cultural Heritage and New Technologies 2013 (CHNT 18, 2013)
Vienna 2014

<http://www.chnt.at/proceedings-chnt-18/>

ISBN 978-3-200-03676-5

Editor/Publisher: Museen der Stadt Wien – Stadtarchäologie

Editorial Team: Wolfgang Börner, Susanne Uhlirz

The editor's office is not responsible for the linguistic correctness of the manuscripts.

Authors are responsible for the contents and copyrights of the illustrations/photographs.

¹⁵ DARIAH-EU partners include, among others, the Dutch DANS (Data Archiving and Networked Services) <http://www.dans.knaw.nl/en> and the ADS (British Archaeology Data Service) with the European data network project ARENA (Archaeological Records of Europe – Networked Access). <http://ads.ahds.ac.uk/arena/> ARENA defines standards in Archaeology (e.g. metadata standards). "The Project is concerned with conservation and presentation of the European archaeological heritage through new information technologies. The ARENA Network partners in Poland, Romania, Denmark, Iceland, Norway and the United Kingdom share and develop expertise in the conservation of archaeological data." <http://ads.ahds.ac.uk/arena/links/standards.html#spatial>