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Digital Archaeological Archiving in Baden-Württemberg, Germany: an evolving system

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Summary

Since 2005, the [Landesamt für Denkmalpflege Baden-Württemberg](#) has been collecting semi-structured archaeological digital project data with the aim of one day turning that data into a real long-term digital archive. This process is still ongoing. In the last 15 years appropriate data formats have been defined, and the transition from CAD to GIS as the mainstay of project recording in Baden-Württemberg has been made. The research-driven development of the Software Survey2GIS (GNU GPL), initiated by the Landesamt für Denkmalpflege Baden-Württemberg, facilitates on the one hand an easy-to-use transition of field data into GIS and on the other better control of data formats. We are learning to cope with increasingly more complex data - laser scan, LIDAR and sfm data. The recent advent of commercial archaeology in the state of Baden Württemberg is another factor with which we are confronted. We have experimented with the best methods of convincing archaeologists, technicians and ancillary staff of the necessity of saving their data in a central repository - for example friendliness, even occasional coercion, as well as the guarantee of recoverable data if the deposition rules are followed. The boundary of each saved excavation or survey project is uploaded to the State's own cultural heritage GIS-Application - ADAB - where it can be accessed by researchers. A simple click within the polygon will invoke metadata about the project as well as a selection of quintessential photos. The excavation archive in Baden-Württemberg is, as yet, by no means a fully accessible, usable 'real' digital archive. But we are succeeding in saving the data in a structured manner for future transition into that 'real' archive - hopefully as a pilot project within the framework of the federally financed NFDI infrastructure.



1. Introduction

'Archive creation and management are not things that only happen at the end of a project, when transfer to a repository is imminent; it is a process that maintains and protects all archaeological archive components from the outset.' (Perrin *et al.* [2014](#), 19). Germany is a federal parliamentary republic with 16 semi-autonomous constituent states each with their own constitution and civil laws. How archaeology is organised across the country varies from state to state. In Baden Württemberg most development-led archaeology is undertaken by commercial firms on a socially tenable 'polluter pays' principle under close control of a special unit of the *Landesamt für Denkmalpflege Baden-Württemberg* (State Office for Protection of Monuments, hereafter LADBW). Most prospection, as well as specialist archaeology, such as wetland and underwater archaeology or palaeontology/cave archaeology, is carried out directly by specialists from the LADBW. The same goes for large research projects such as that in the environs of the early Iron Age Heuneburg hillfort with funding by the German Research Council: *Settlement and culture landscape development in the environs of the Heuneburg during the Hallstatt and Early La Tène periods*. Generally, documentation (all of which is now digital) takes place according to a set of rules laid down by the LADBW. ([PDF](#))

2. Legislation

As far as archiving archaeological data in the Federal State of Baden-Württemberg is concerned, two different sets of legislation are of interest:

the [Denkmalschutzgesetz](#) (Monument Protection Law) version 6, December 1983 and [Landesarchivgesetz](#) (State Archive Law) version 27, July 1987.).

The *Denkmalschutzgesetz* defines the LADBW as being the agency responsible for maintaining 'central specialist libraries, documentation, specialist databases and other central services' (DschG § 3, 4 and DschG § 3a, 6). The State Archive is also mentioned as responsible for heritage protection in 'archiving affairs' (*archivwesen*), though without further exact specification (DschG § 3, 5). The 'documentation' and 'specialist databases' mentioned as a duty of the LADBW in the *Denkmalschutzgesetz* implies a self-archiving function for the LADBW; on the other hand, the *Landesarchivgesetz* is very clear in stating that the *Landesarchiv* is responsible for secure archiving of all documents emanating from State Government Agencies (of which the LADBW is one). These specifically include 'written documents, files, index cards, maps. Plans, photo, film and audio material as well as information media...' (LarchG § 2, 2). 'State Government Agencies, Courts and other agencies are to offer all documents (to the Landesarchiv) which they no longer need for the carrying out their duties' (LarchG § 3, 1). With respect to the LADBW this sentence is important, because it does call into question whether the LADBW can, within its cultural heritage brief, offer any documents up to the *Landesarchiv* at all? It is arguable that a heritage protection agency possesses no obsolete documents. It is simply not possible to foretell future urban or land development. Therefore, a heritage protection agency potentially *always* needs *all* archaeological documents in its possession to be able to work consistently and efficiently in all parts of the state. The *Landesarchivgesetz* goes on to say that whether or not the documents are needed by the agency that produced them, they *must* be offered to the State Archive 30 years after they were created. After around three decades of digital archaeology the earliest data is close to 'ripening' to that



deadline. But once again, there are problems. It is questionable (though not yet tested) whether the *Landesarchiv* would/could take on data for deposition from the LADBW. The *Landesarchiv* is staffed (as one would expect) by professional and proficient archivists. But they are not archaeologists. Diverse, 'difficult', maintenance-intensive digital archaeological data might not seem an attractive prospect, especially as the definition of long-term archiving favoured by the Association of State Archaeologists in Germany is 'forever'. Therefore, there would be no opportunity for any selection and disposal at all - for which, in turn, not just archiving but also archaeological expertise and judgement according to pure archaeological criteria would be necessary.

The situation regarding responsibility for the long-term well-being of digital archaeological data in Baden-Württemberg is, it seems, somewhat unclear. In practice the LADBW remains in close contact with the *Landesarchiv* but at present has taken on responsibility for the safety, security and longevity of its own very specific and very diverse digital archaeological data itself.

Since around 2005 the LADBW has been collecting semi-structured archaeological digital project data with the aim of one day turning that data into a real long-term digital archive. This process is still ongoing. In the last 15 years appropriate data formats have been defined, and the transition from CAD to GIS as the mainstay of project recording in Baden-Württemberg has been made. The research-driven development of the open-source tool *Survey2GIS* (GNU GPL, <https://survey-tools.org/>), initiated by the LADBW, facilitates on the one hand an easy-to-use transition of field data into GIS and on the other better control of data formats. With increasingly more complex data - laser scans, LIDAR and SFM-data, the archiving learning curve is steep but manageable. The recent advent of commercial archaeology in the state of Baden Württemberg is another factor to be considered. Studies have been implemented to discover the most appropriate factors to convince archaeologists, technicians and ancillary staff of the necessity of saving their data in a central repository. For example: the promise of swift data recovery should the excavator 'lose' his/her records, hotline-support in the archive with a personal contact person, and coercion (which has so far provided the most convincing results!). The bottom line is: No data = no archive. At least we have the data!

The excavation archive in Baden-Württemberg is, as yet, by no means a fully accessible, usable 'real' digital archive. But if the LADBW is successful in preserving the data in a structured manner in real time now, it will have succeeded - and IS succeeding in saving the primary data for future transition into that 'real' archive to which it aspires.

3. Data

The saved data are very diverse. Even though data formats have now been defined for present and future projects, much of the older data was created in a period during which computers and computer applications were being enthusiastically introduced into archaeology and their active use was rapidly (and rightly) increasing and developing. Simultaneously, it was a time of experimentation and discovery. It is safe to say that it took some time until archaeologists were in control of (computer) operations and began to understand what they were doing - especially with regard to the formats and longevity of their data. So far, due to lack of capacity, little has been undertaken to test the readability and/or sustainability of this legacy data. The best that can be said at present is that the bitstream has been preserved. Data from around 2007 and later conform largely to predefined formats and data structure.



The data pool at the time of writing consists of the primary data from around 4000 excavations, surveys, fieldwalking, (supervised) metal-detecting projects as well as some finds reports, augmented by data from almost 500 geophysical prospections. This data pool is rounded off by thousands of professionally created photographs, mostly of finds highlights from the last two decades. The volume of data adds up to around 30 Tb - ever growing. In physical terms the data are stored, as securely as is possible for a state agency, on state-owned servers inside the so-called *BITBW* (<https://www.bitbw.de/>), the state central information technology service.

A useful tool for estimating efficacy in digital archiving is Adrian Brown's 'archiving maturity matrix' (Brown 2011). Clearly the LADBW has cleared '0 - No awareness' and '1 - Awareness' and is positioned on or around '3 - Basic process' while continuing to develop its roadmap (Figure 1).

Maturity Levels

Stage	Maturity Level	Description
Awareness	0 – No awareness	The organisation has no awareness of either the need for the process or the basic principles for applying it.
	1 – Awareness	The organisation is aware of the need to develop the process, and has an understanding of basic principles.
	2 – Roadmap	The organisation has a defined roadmap for developing the process.
Capability	3 – Basic process	The organisation has implemented a basic process.
	4 – Managed process	The organisation has implemented a comprehensive, managed process, which reacts to changing circumstances.
	5 – Optimised process	The organisation undertakes continuous process improvement, with proactive management.



Figure 1: Adrian Brown's archiving 'maturity matrix' with self-estimated position of the LADBW at time of writing

4. Structure

The implementation of the 'Basic process' has its origins in analogue filing systems, where written documentation finds its way into tabbed lever-arch files, drawings into folders and photos into albums. The first *digital* folder structure was introduced by the LADBW in 2007 (Figure 2). It served its purpose well for over a decade in structuring project data, the minimum requirements of which are threefold: an internal unique identifier, 'digital fallout' and a georeferenced position. Baden-Württemberg employs internal unique identifiers: year_sequential number (four position), e.g. 2020_0176. Whether the project produced features or finds or not, is *per se* secondary as far as its recording as a project is concerned. Of primary importance is that an excavation/project took place and has a geographically referenceable find spot or circumference. The 'containers' on the data share are named after the referenceable top level of the data



structure hierarchy and at present are still administered by means of a 'simple' spreadsheet.

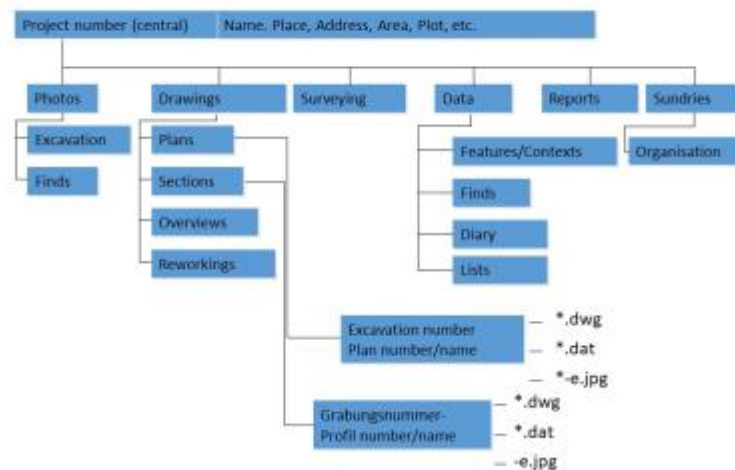


Figure 2: Original digital folder structure was introduced by the LADBW in 2007 (English translation)

5. Accessibility

In 2018 a revised data structure was introduced to accommodate ever more complex data and the parameter-change from CAD to GIS as the primary recording system for plan material. Another important addition is the *ADAB* folder (Figure 3, top left). In this folder the excavator must deposit a georeferenced polygon of the boundaries of the project, metadata according to a strict internal scheme and up to twenty representative photos. In turn this information lands on a dedicated GIS layer of the Baden-Württemberg *ADAB*, the state cultural heritage information system (Figure 5). Cultural heritage professionals can search the layer according to a number of parameters. A click on the polygon will invoke basic (meta) information about the project and a review of informative photos (Figure 6).

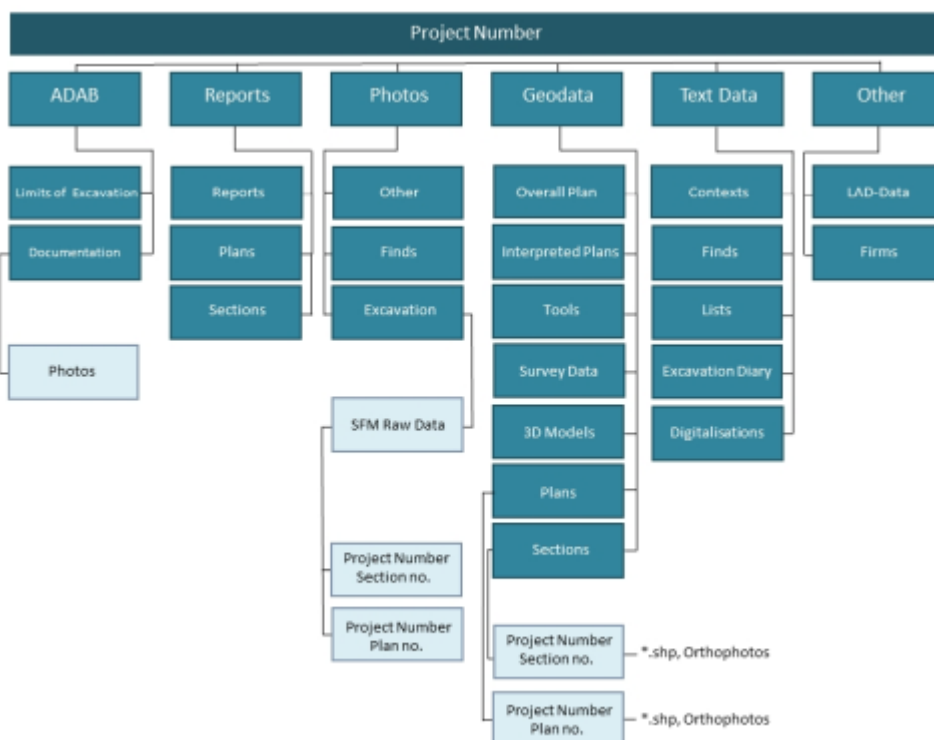


Figure 3: Revised digital folder structure was introduced by the LADBW in 2019 (English translation)

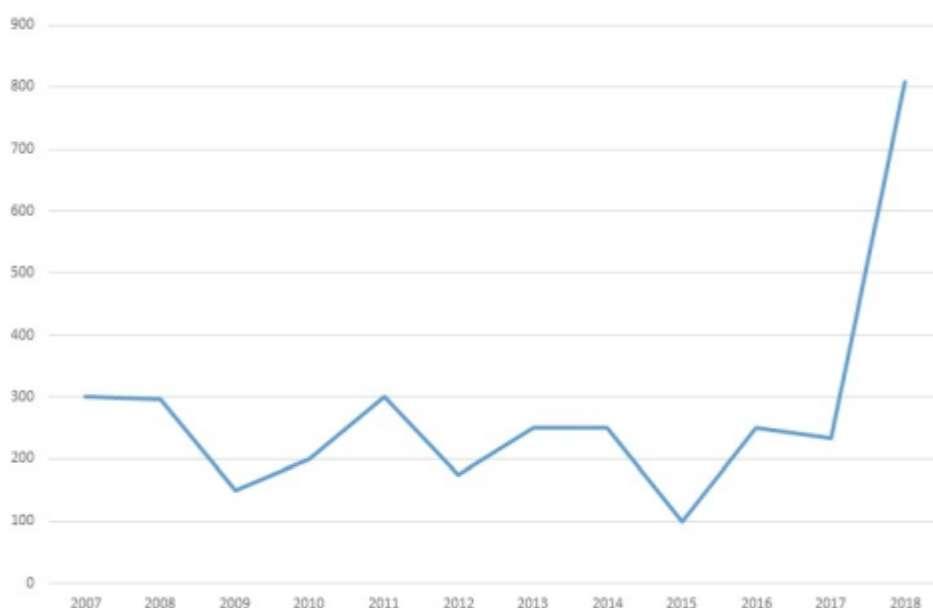


Figure 4: Project deposition frequency in Baden-Württemberg 2007-2018

6. Acceptance

Starting in 2007 the 'archiving service' for excavations and projects was originally simply offered as an internal service to colleagues to back up their data. Although the service offered nothing but advantages in terms of data security, general acceptance was not



immediately forthcoming. The rate of deposition was low. Subliminal worries about 'intellectual property' or fear of external content checks were palpable, as well as scepticism about the extra work involved in 'tidying up' the documentation for the archive.

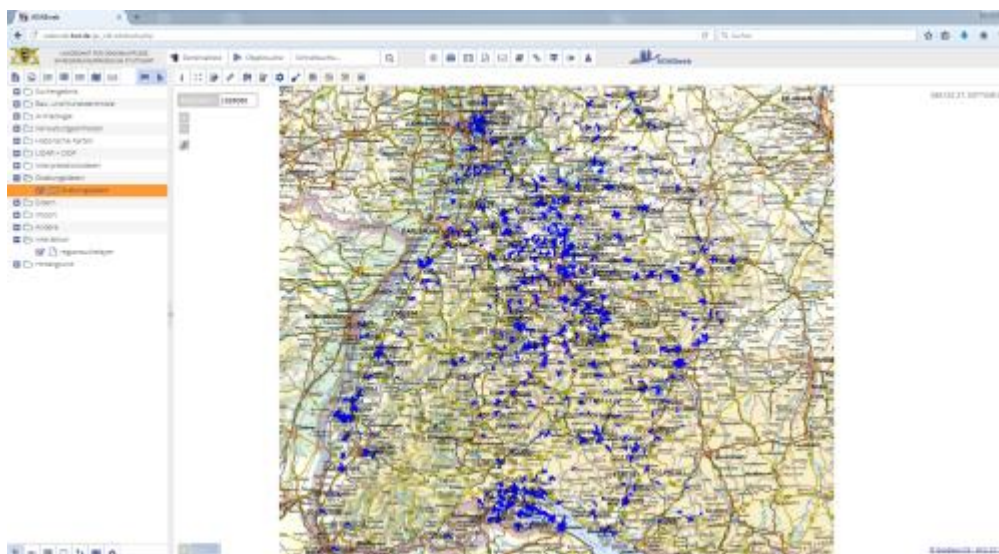


Figure 5: ADAB heritage information system with all excavations in the system

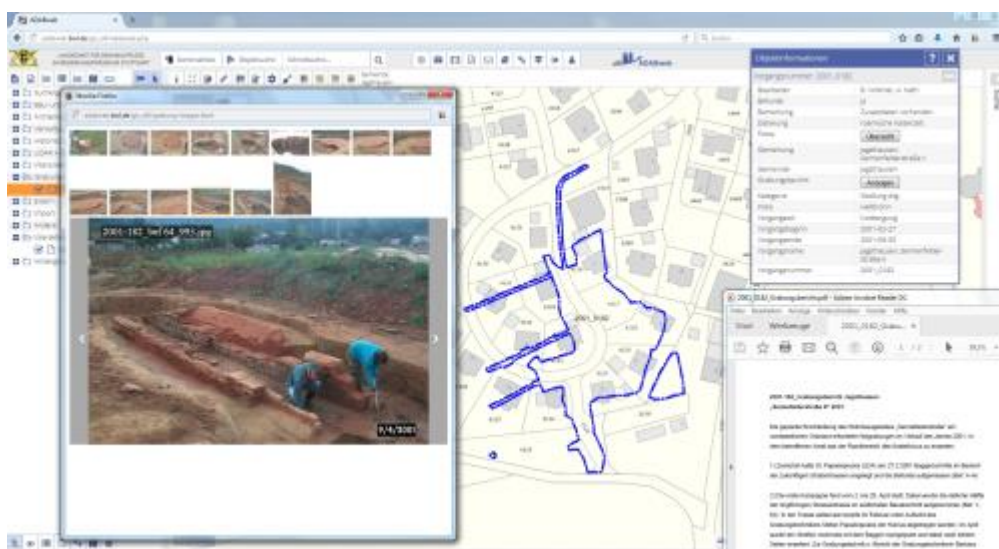


Figure 6: ADAB heritage information system with excavation layer information: (meta) excavation information from the archive, short excavation report and representative photos

In 2017, the State Archaeologist, the highest archaeological Civil Servant in the State, issued a directive to the archaeological staff of the LADBW specifying that the secure deposition of structured raw project data is an official obligation and not simply an option. Only then did the deposition rate (dramatically) improve (Figure 4). Interestingly, once this concept had been 'rammed home' and teams began to accept the inevitable and build the concept of data security into their daily work routines, acceptance increased surprisingly swiftly and has remained high ever since - but it did require the 'shock treatment' of 2017 to flick the switch. Within the LADBW it has been possible to establish a small permanent team dedicated to digital archaeological archiving. This is



important not just for continuity but also for communication and professional support. Actors in the field now have permanent access to a friendly, personally identifiable advisor, should they, at any stage of their project, have questions on data security and/or final archiving. This modest 'human touch' has made a big difference. And at all levels within the LADBW there is now a realisation that archiving is not just an unpleasant task to be appended onto the end of a project when all the financial and human resources are close to expiring, but a necessary, expedient project-concomitant activity.

7. Conclusion

The LADBW's self-estimated position '3 - Basic process' in Adrian Brown's archiving maturity matrix shows that while progress has been made and it is now accepted practice that excavation and project data are securely stored in a structured manner, there is still a long way to go. The LADBW has built a solid foundation in terms of the size and richness of the data pool. The challenges of the coming years will be the transformation of this rich data pool into a modern, state-of-the-art archive with fully findable, accessible, interoperable, and reusable data.

Brown, A. 2011 *Best Practice and Minimum Standards in Digital Preservation*, London: Oracle PASIG, UK Parliament.

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1). <https://archaeologydataservice.ac.uk/arches/>