

# Data Structures for Major Archaeological Projects in the Rhineland Area, Germany

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**Keywords:** Large excavations, databases, GIS, document repository

## Introduction

National or regional archaeological databases have a long tradition in digital cultural heritage management. For instance, the book edited by Larsen in 1992 provides information on such databases in nine different countries, including the database in the Rhineland Commission for Archaeological Sites and Monuments (abbreviation in German: ABR) in Bonn, Germany (Scollar, 1992). As in most countries, the software for this database has been updated several times since 1992, and this information system nowadays includes a powerful GIS component as well as a document management system (Herzog et al. 2014; Herzog 2018). An important component of this system called BODEON is the management of planning projects, and this paper will focus on this unique component.

The main aim of the ABR is the protection and research of archaeological and palaeontological monuments in a densely populated area covering more than 12,000 km<sup>2</sup> (Fig. 1).

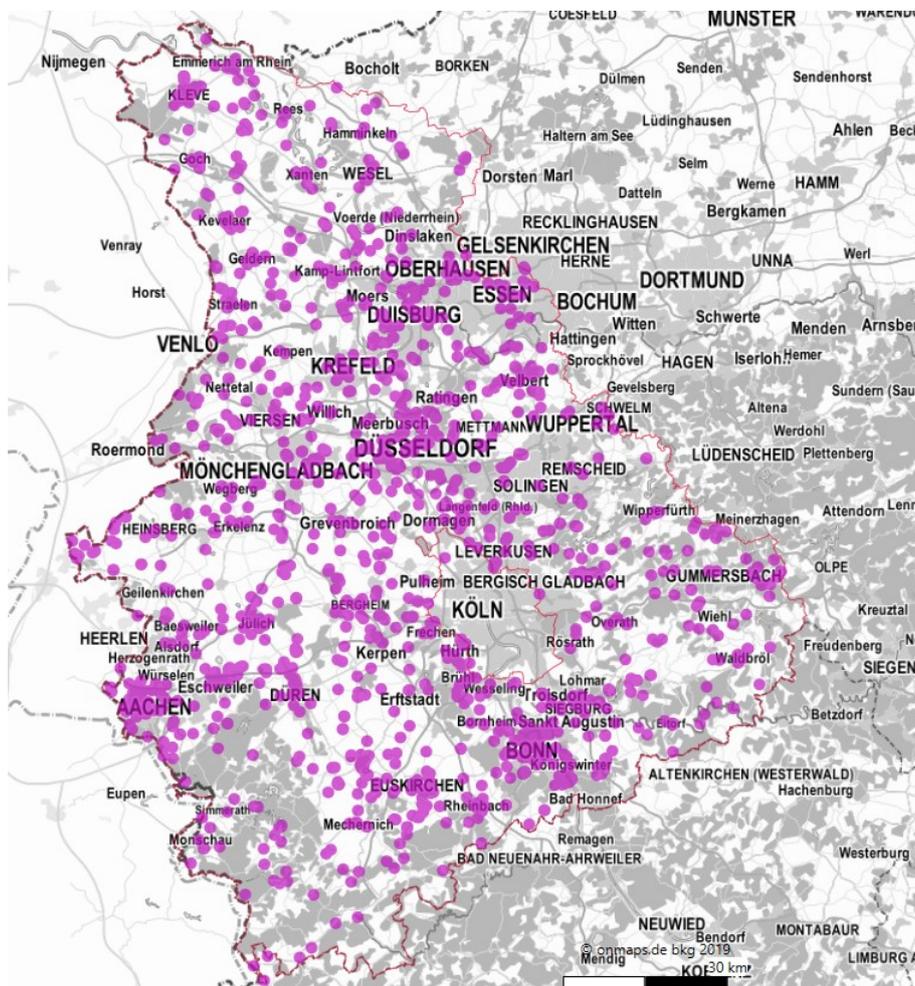


Fig. 1. BODEON screenshot: New planning projects in 2018 recorded for the Rhineland (© Irmela Herzog)

For each planning project in the Rhineland (excluding the city of Cologne), the ABR analyses the probability of archaeological remains in the affected area based on previous archaeological investigations recorded in BODEON. Another source of information are the web map services (WMS) provided by the local ordnance survey institution (Geobasis NRW). Moreover, it is important to check the statements by the ABR concerning

previous projects covering the same area. This saves time and ensures consistency. These statements are recorded in the planning project component of BODEON. In negotiations with the ABR, an investor may decide to commission a rescue excavation, the main data of which will be imported in BODEON, forming a basis for assessing future planning projects, but also for research. This paper will describe the digital management of planning projects that affect archaeological remains using an example from the city of Bonn.

Data base record type	New in 2017	New in 2018
Request for assessing the archaeological potential of a spatial planning area (mostly concerning infrastructure projects of varying sizes)	1855	1666
Processing step for a spatial planning area classified as outgoing mail	4269	3428
Rescue excavation initiated due to a planning process	354	331
Archaeological feature recorded during a rescue excavation	22,901	22,208
Photograph (+ meta data) taken in the course of a rescue excavation	42,765	23,407
Archaeological investigation not classified as rescue excavation	1738	1317

Table 1. Number of new entries in 2017 and 2018 for several data categories

However, BODEON is not only important for managing major projects but has also become an indispensable tool for nearly all archaeology related office work in the ABR. This is illustrated by the amount of new data records entered in the years 2017 and 2018 (Table 1).

## Data management

When receiving a new request for assessing the archaeological potential of a spatial planning area, a new database record is entered in the planning project component of BODEON. This record includes the boundaries of the affected area, which are imported or digitized from paper maps using the tools of the GIS component. Moreover, for each of the planning records, the corresponding processing steps are entered in the database. Typically, a new processing step is created when sending or receiving a mail dealing with a planning area. Both the mail texts and any attachments are stored in the document management system (<https://mediafiler.com/en>) seamlessly integrated in BODEON.

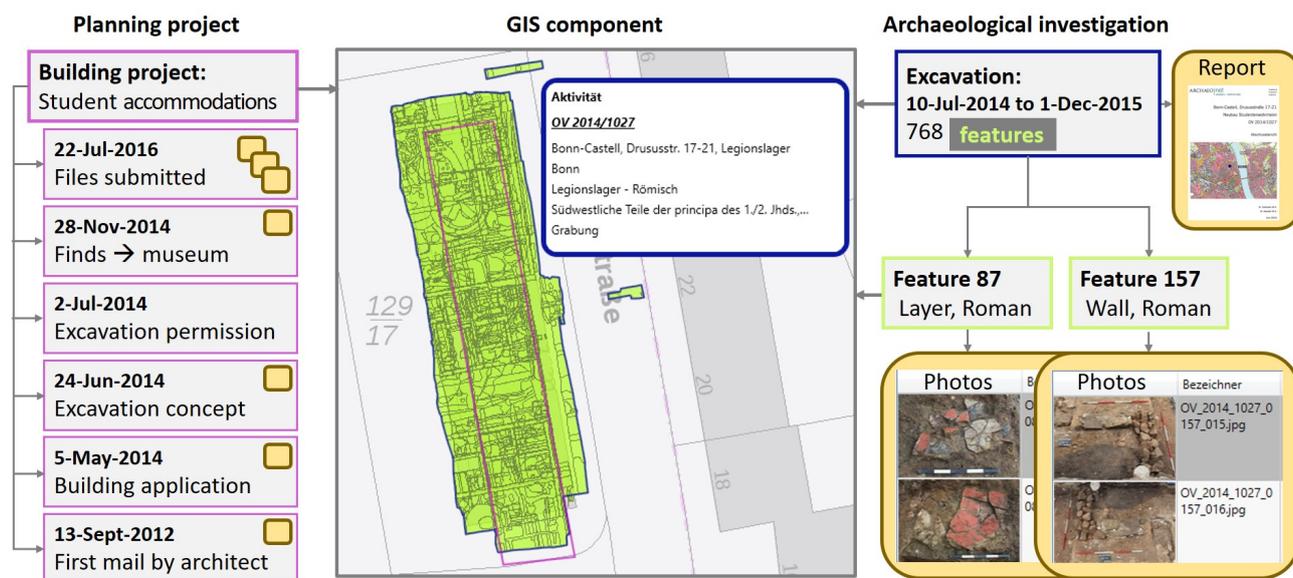


Fig. 2. BODEON: Simplified data structures and relationships illustrated by an example from Bonn (© Irmela Herzog)

Fig. 2 illustrates the data structures implemented in BODEON, taking the planning project for student accommodations in the city of Bonn as an example. Only selected processing steps of the planning project are shown. The planning project data base entry was created after receiving an architect's mail requesting information on the archaeological remains in this area. Later, the investor has initiated a rescue excavation,

during which 768 features were documented. The BODEON data structures for the excavation data are outlined in the right part of Fig. 2. Rounded rectangles with yellow background indicate documents that are linked to the corresponding data base records. Any number of documents can be linked to a processing step, an archaeological investigation, an archaeological feature or an artefact record in BODEON. Planning projects, archaeological investigations and the features detected during such investigations use the same GIS component and a common data structure for recording location information.

## GIS component

The central part of Fig. 2 is a screen shot from a BODEON map showing the pink spatial planning area. In the course of the planning project, several versions of the planning area may be under consideration, all versions can be stored in the database; by default, the most recent plan is displayed. Typical GIS tools such as measuring, subtracting areas, info-tool, moving or deleting nodes are supported. Moreover, BODEON automatically derives data from any map object entered, including the corresponding parish(es) and bounding box coordinates. Geobasis NRW provides WMS layers not only for topographic maps on different scales but also for three sets of rectified historical maps, aerial images (most recent; 1988-1994), and hill-shading of Lidar data (resolution 1 m), that can be invoked by merely two mouse clicks. A lookup table stores the links for additional layers used less frequently such as colour infrared aerial images. The boundaries of parcels or buildings shown in the cadastral map layer can be copied easily for any BODEON object. The goto tool supports navigation to a user-supplied address or cadastral parcel number.

At the start of the excavation, a point object indicates the location of the excavation area. After the contract archaeologists submitted the files to the ABR, the boundaries of the excavation area and all features are imported as well as the corresponding metadata.

In Fig. 2, the mouse cursor was positioned on the excavation area when the screen image was captured, therefore selected metadata of the excavation is displayed in a rounded rectangle. In the excavation recording system used in the Rhineland, the term feature may refer to subdivisions of the excavation area as well as to archaeological features. This is why the features cover the complete excavation area in Fig. 2.

## New Version and Future Perspectives

BODEON started as a Windows program based on the plug-in Silverlight. As Microsoft ends the support for Silverlight in October 2021, BODEON was recently converted to a desktop program that can be started by an exe file. The internet is only used for transferring the data. Due to Rhineland specific WMS layers, language and licensing issues, the effort for adjusting this software for other archaeological institutions is not to be underestimated. However, developers of comparable information systems might be interested in setting up similar data structures for managing the archaeological aspects of planning projects.

Currently, planners do not have access to BODEON. Archaeological expertise is required to assess the potential and limits of the archaeological data recorded in BODEON, with the first find reports going back well beyond 1800. Contract archaeologists often prepare their excavation projects by visiting the filing department of the ABR, where they can use a BODEON PC. Due to data protection issues, such users do not get permission to inspect the documents associated with planning projects. In the medium term, it is the aim of the ABR that contract archaeologists enter their own rescue excavation data.

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