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## INFORMATISATION STATE OF THE ARCHAEOLOGICAL RESEARCH ARCHIVE

### Abstract

**Purpose:** *The Slovenian archaeological and museum profession is confronted with informatisation in all areas of work, including preservation of archives of archaeological research, which is the focus of the present study. The aim of the paper is to provide a systematic overview of the development of informatisation and the current state of the art in this field, to identify current issues and to point out suggestions for further activities. The main question is how, in what way and by whom, if at all, the informatisation of the archive of archaeological research is being carried out in the relevant institutions. The literature review in the context of research showed that the archaeological profession only started to deal with the informatisation of the archaeological research archive in the 1980s. It then continued to develop several in-house information systems in the 1990s, as the sectoral legislation, including archaeological, archival and museum legislation, did not have clearly defined guidelines. The need for an integrated approach to data management was highlighted at the Slovenian Museum Society Assembly in 2010.*

**Method:** *In the first phase of the research, a compilation/description method is used. In the second phase of the research, a survey/interview method is used, and the analysis evaluates the results of this method.*

**Results:** *The survey showed that the current state of informatisation of the archives of archaeological research in competent institutions is sufficient, with various information systems in use. The Ministry of Culture made the eArchaeology application mandatory in 2022, but it does not provide an integrated solution.*

**Conclusions:** *The research shows that, in order to reach an optimal level, the archaeological, museum and archival disciplines need to work together. At present, the most work being done is in the field of archives. This research raises several issues in the field of informatisation of the archives of archaeological research. These are as follows: weaknesses of the number of IS (information system) in use, the lack of uniformity of code lists, the possibilities of integrating IS into the central information system, the standardisation of processes, the adherence to ISO standards, and uniform technological requirements. All of these will have to be answered in the future.*

**Keywords:** *archaeological research archive, informatisation, archaeology, archival science, museology.*

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## 1 INTRODUCTION

The concept of an archaeological research archive is relatively recent. The first official definition is found in the Protection of Cultural Heritage Act (ZVKD-1, 2008, 2019) and in the Rules of Archaeological Research (PAR, 2013, 2022). According to the sectoral legislation, the archive of archaeological research is kept in its entirety in the competent museum and has a defined composition. In contrast, the two sectoral acts do not clearly define the manner and form of storage. The matter is more or less left to the competent institutions.

Article 2 of the PAR (2013) defines the term archaeological research archive as „ *the result of a single archaeological site, together with all archaeological finds, samples and all documentation accompanying the archaeological research and excavation or post-excavation treatment, and must be permanently preserved as a collection in a way that allows access to the professional and general public.*”

Novaković et al. (2007) note that before the adoption of the PAR, Slovenian archaeology did not have a comprehensive system of standards and similar regulations governing archaeological field documentation, finds and samples, and archiving.

The documentation that archaeologists produced in their work was more or less up to them to decide what and how to document and what and how to archive, as can be seen in the documentation of ancient archaeological research held by museums. The situation is different with finds and samples that were part of the museums' collections, which were inventoried and kept in an accession book. A good example is Kranjski deželni muzej, today the National Museum of Slovenia, founded in 1821, where all the material excavated and acquired by Karel Dežman (curator 1852 – 1889) was inventoried under the direction of Alfonz Müllner (curator 1889 – 1903) (Bitenc, 2010). As Bitenc (2010) states, he diligently kept an accession book, illustrating the entries with sketches of the objects. Under the direction of Rajko Ložar (curator 1928 – 1940), they also produced card files on the finds in addition to the inventory and accession books. After World War II, individual departments were organised within the museum, including the Department of Archaeology, headed by Stane Gabrovec (head of department 1948 – 1975). Archaeology thus caught up with developments in Europe and this is reflected in the documentation of the department (object files with all available data, numbering of negatives and archival material, the creation of registers linking data, a register of images, etc.). As the quantity of acquired objects increased, so did the amount of documentation relating to them. Thus, at the beginning of the 1980s, the need for digitisation arose, namely the creation of basic databases (Bitenc, 2010). As Stančič (1989) states, the need for the use of computers in archaeology was growing and was a consequence of the continuous increase in data. Computer data processing thus covered the field of archaeological field research, archaeological cabinet work, and the documentation of finds in museums. However, at that time, Stančič (1989) expressed the fear that due to limited communication between the individual research institutions themselves, there was a high probability that they would develop their own computer applications in a completely disconnected way.

His fears were justified. Indeed, this is what happened in the late 1980s and 1990s. „*Mass storage and electronic data processing was made possible by the widespread use of information systems tailored to museums or created for museums. We can discuss the information revolution that informatics brought to museums.*” (Perko, 2010, 8)

Grosman (1991) notes that in the early 1990s, a proposal was made for a Project for the Formation of a Museum Documentation Centre (INDOC). The legal basis for this was the previous Social Information System Act, which projected standards (classification, nomenclature, identification) and a unified methodology for collecting, processing and

displaying data. The aim was to establish a national documentation system. This would make it possible to find information on museum inventories, including archaeological finds and samples with documentation in one place for research purposes. The goal was to harmonise and standardise scientific documentation on cultural heritage.

The biggest problem was that the disciplines, including archaeology, did not have their own standards, terminology or a properly defined relationship between the old databases and the new machine-based methodologies. The archaeological profession highlighted the following issues: readability of data, the possibilities and speed of data processing, the possibility of direct machine capture of data, the question of the choice of computing media.

A survey of the state of documentation and its informatisation in Slovenian museums, with an emphasis on the documentation of archaeological objects from the early 1990s yielded the following data.

Mikuž (1991) notes that the following issues were already being raised at that time regarding documentation arrangements: interest, common standards (aligned with ISO and national standards), terminology standards, and classifications. All these items are the basis for the creation of an IS. Compatibility with other disciplines was also highlighted (Mikuž, 1991), which is justified, as archaeology is seen as multidisciplinary discipline.

Mikuž (1991) notes that museums have used various information systems (IS) to document archaeological objects: MODES, dBase III, dBase III+, dBase IV, NUMIZ, SITULA and BELO. We can deduce from what was stated above that the archaeological material hasn't been precisely defined. This is possibly due to the fact that the finds and samples have been documented in different museums with similar IS, incorporating different standards. In terms of usage percentage, the most used was MODES, which is aligned with international standards, and ICOM recommendations for CIDOC documentation. All of these were adapted to Slovenian specifications. NUMIZ is also an interesting IS. According to Kos (1991), this system is the result of the own development of the Numismatic Cabinet of the National Museum of Slovenia in cooperation with an external collaborator. It was made for the specific field of numismatics.

The most advanced in the field of informatisation or digitisation was the National Museum of Slovenia, which developed its own IS SITULA in cooperation with external experts for the needs of the archaeological department. This IS contains the Archive module, which contains several levels: written documents; drawings, plans, maps; photographs and a *hémérothèque* (Bitenc, 1991). It can be said that for the first time, we are encountering the basic idea of informatisation of archiving archaeological research.

In the mid-1990s, the need arose for an IS that would serve as a kind of a register of archaeological sites and would be accessible to the entire professional community. The aforementioned IS are of a closed type and were intended exclusively for a single institution. This gap should be covered by the Catalogue of Archaeological Sites of Slovenia (Arkas), the design of which was prepared by the Institute of Archaeology of the Slovenian Archaeological Centre (Hvala Tecco, 1991). According to Hvala Tecco (1991), this involves an IS or a database on the immovable archaeological heritage of Slovenia, which contains basic information on archaeological sites and the collected material and literature. The Documentation module also contains archival material. The basic idea is that the Catalogue is the primary cell to which the secondary cells are attached, i.e., museums, the Institute for the Protection of Cultural Heritage of Slovenia (ZVKDS, Zavod za varstvo kulturne dediščine Slovenije) the Department of Archaeology of the Faculty of Arts in Ljubljana (FF, Oddelek za arheologijo, Filozofska fakulteta v Ljubljani) and the

Institute of Archaeology of the Research Centre of the Slovenian Academy of Sciences and Arts (ZRC SAZU, Znanstvenoraziskovalni center Slovenske akademije znanosti in umetnosti) (Inštitut za arheologijo ZRC SAZU).

According to Mlekuž Vrhovnik (2019), the Centre for Preventive Archaeology of the ZVKDS has developed an IS that brings together all data on archaeological traces and interventions in Slovenia. It comprises several databases, namely a catalogue of sites, which builds on the archaeological topography project and was created by merging other databases, e.g., Arkas and the Register of Immovable Cultural Heritage. The second database contains digitised site plans; the third represents archaeological research records. The IS also collects the results of systematic archaeological interpretation of airborne laser scanning and interpretation of cyclic aerial photography of Slovenia.

In 2009, the Service for Movable Cultural Heritage and Museums carried out an evaluation of Slovenian museums for the period 2006–2008 (Stančič Oven, 2010). Stančič Oven (2010) summarises that the analysis showed a very poor state of documentation, with only 30% of museum material being documented in analogue form, and only 10% in digital form. The evaluation showed that not all museums use IS; some still use WORD, EXCEL and ACCESS. The most widely used museum IS is GALIS, a minority use FUNDUS, MINOK and Museum Collections (now KRONOS). Some museums have their own IS, e.g., SITULA and PATINA, which they use for archaeological collections.

Until 2010, literature did not provide IS with technical information on software, uniform technological requirements, standards and internal rules. Stančič Oven (2010) mentions the standards that were valid for the field of museum inventory and cataloguing (AFRICON, SPECTRUM, Object ID, Dublin Core) in the chapter "Digitisation software". However, at the 2010 Slovenian Museum Association meeting in Bela Krajina, Harrison and McKenna (2010) from the Collection Trust in London presented the field of data management of museum objects, touching upon the issues of documentation procedures, the importance of standards, uniform technological requirements, identification of internal processes, etc. They noted that this suggests the need for an integrated approach to data management. They presented the SPECTRUM museum standard. One of the objectives of the standard among other things is to create an archive that must be guaranteed to be durable and secure (Harrison & McKenna, 2010).

The Ministry of Culture established working groups in 2013 that prepared guidelines for the capture, long-term preservation, and access to cultural heritage in a digital form. The aim was to accelerate the development of the informatisation of cultural heritage, including archaeological heritage, for the effective use of digitised and born-digital material, as well as creating conditions for wider public use (MK RS, 2013). This is a complex document and provides a foundation for the field of creation, capture, long-term preservation, and access to e-archives of archaeological sites (MK RS, 2013).

In 2017, the Ministry of Culture started to address the rather urgent and chaotic situation in the field of informatisation of cultural heritage with the eHeritage project, the part of which is also eArchaeology. Kovačec (2021) states that the aim of the project is to strengthen the use of e-services in the field of cultural heritage and increase the transparency and efficiency of heritage protection in space. The operational objectives are all linked to the field of archaeology. They are as follows: establishing a system for effective recording and monitoring of archaeological research, setting up modern and sufficiently powerful information communication technology (ICT) and infrastructure, and ensuring permanent preservation of digital content (in particular the register of immovable and living (intangible) cultural heritage and archaeological research reports), which was realised in 2022.

The review of the archival literature did not yield any results regarding the treatment of archaeological research archives, especially archaeological field documentation, from the perspective of the archival profession. Budna Kodrič (2016) notes that in recent decades archivists have replaced the scientific treatment of material with the study of classification schemes and internal rules. They have been more concerned with the creators and their office operations than with the users of the material, their wants, and their needs.

Informatisation is now part of our everyday lives. The archaeological profession is confronted with informatisation in almost all areas of its work, in the field, in post-excavation data processing and, last but not least, in the preservation of archaeological research archives. This article presents the field of informatisation of archaeological research archives, namely an overview of the research carried out so far and current issues that raise a number of questions, which are as follows: Given that the legislation in this area is rather loose, do the competent institutions ensure the long-term e-storage of the archaeological research archive as a whole or only partially and in what way? Do they have internal rules for capturing and e-preservation of the archaeological research archive? How and in what way are databases managed? How do they ensure secure e-storage, and at what intervals? And finally, who is implementing the informatisation of the archaeological research archive?

## 2 METHODOLOGY

The first phase of this research on the informatisation of the archive of archaeological research focuses on literature review in the field of research in order to obtain a more comprehensive picture of the development of informatisation to date. The method used to obtain the data was compilation/description based on already known research and publications in the field. The literature review showed that the literature is limited, which stems from the fact that the archaeological, museum and archive professions didn't systematically deal with this issue. In the beginning, these were initially only attempts at implementation, even though the archaeological profession has clearly expressed the need for informatisation.

The second phase of the research focused on the current state of informatisation of archaeological research archives, using a survey and interview method. The questionnaire was sent to the stakeholders who keep archives of archaeological research, namely eight museums (National Museum of Slovenia (slo. Narodni muzej Slovenije), Museum and Galleries of Ljubljana (slo. Muzeji in galerije mesta Ljubljane), Museum of Dolenjska Novo mesto (slo. Dolenjski muzej Novo mesto), Posavje Museum Brežice (slo. Posavski muzej Brežice), Celje Regional Museum (slo. Pokrajinski muzej Celje), Ptuj Ormož Regional Museum (slo. Pokrajinski muzej Ptuj Ormož), Škofja Loka Museum (slo. Loški muzej Škofja Loka), Regional Museum Goriški muzej (slo. Goriški muzej)), the Institute for the Protection of Cultural Heritage of Slovenia and the Institute of Archaeology ZRC SAZU. The criterion for the selection of museums was the amount of archaeological material they hold.

The questions were designed to obtain data to identify or detect the current state of play in this area. Six stakeholders out of eleven responded. In order to better understand the issues, two interviews were conducted with an archaeological curator and a documentary curator, both of whom are employed in different museums and work directly with archaeological research archives.

Based on the survey and interview responses, the current state of the art in this area was valorised using the method of analysis.

### 3 RESULTS

Perko Vidrih (2010, 8, 10) notes that „informatics has brought radical technological, organisational and economic changes to museums. The use of ICT has transformed static [data] into museum archives, locked, strictly separated data into hypermedia documents. Their individual parts are interconnected through different computer databases, enabling the unimaginably rapid growth of all human knowledge.“

The archaeological research archive is also part of this global museum informatisation. The legislation in the field of informatisation of the archive of archaeological research is very loose, which is reflected in the use of different IS in museums and at different levels of informatisation of the archive of archaeological research as a collection at the level of preparation, capture and e-storage. PAR (2013) defines in detail the Unified Technology Requirements (UTR) only in instructions for submission of the first report in digital form and the final expert report in digital form.

What can be observed from the survey (questionnaire) is the current state of informatisation of the archaeological research archive in the competent institutions, i.e., how, in what way and by whom the informatisation of the archaeological research archive is being carried out in competent institutions.

On the basis of obtained answers it was found that the competent institutions generally use different IS for documenting and archiving the archive of archaeological research (documentation, finds, and samples), as well as for inventory and accessioning finds and samples.

The most commonly used IS is Gallis, followed by KRONOS and SITULA. Gallis and KRONOS are IS developed by external service providers in cooperation with institutions. IS have been used in museums since the 1990s. Additionally, they have been used on a larger scale since the beginning of the 21<sup>st</sup> century.

IS Gallis is the most widely used museum documentation management software in Slovenia, used by most museums. The primary purpose of Gallis is to record documentation material and manage related processes (Semantika, 2019).

IS KRONOS is a system for managing museum activities and documentation and was developed in cooperation with the Museum and Galleries of Ljubljana. It was primarily developed for the purpose of documenting the archaeological collections of the then City Museum of Ljubljana (Mestni muzej Ljubljana) (Orehovec, 2010).

SITULA is an IS developed by the Archaeological Department of the National Museum of Slovenia and an external collaborator and was developed for the needs of the institution (Kos, 1991). The programme is designed on two levels, namely for the storage and processing of data (object files, photographic material, archives) and for the central registry of archaeological collections of Slovenia (Bitenc, 1991, 20).

The majority of participants document the archaeological research archive as a single entity, which implies that finds, samples and documentation are recorded separately. These individual entities are not, however, interlinked within the IS to form an archaeological research file, which in fact, indicates that the archaeological research archive is not treated holistically, which reduces its quality in terms of uniformity of treatment, coverage and permanent preservation.

All IS have code lists with predefined attributes, mostly defined by the stakeholder. The attributes were predefined only in one case.

Most of the stakeholders document to the IS on a monthly basis. The documenting is mainly done in the domain of the archaeological curator, the documentary curator, but also with the help of students.

Stakeholders using the IS for the creation, capture and long-term e-preservation of archaeological research archives should have internal rules for capture and e-preservation according to the Law on the Protection of Documentary and Archival Material (ZVDAGA), but the survey showed that most stakeholders do not have internal rules and are not aware of the relevant sectoral legislation. Only two stakeholders have adopted internal rules for capture and e-storage.

Based on the interview, it was found that museums keep archives of archaeological research both physically and digitally in the IS. Old physical archives and physical documentation of the archaeological research archive are digitised, but they do not follow the Rulebook on uniform technological requirements for capturing and storing material in digital format (PETZ, 2020) and ISO standards ISO 14721:2012, ISO 15489 - 1, ISO 15489 - 2 because they are not familiar with them. However, there is a trend for archaeological excavators to submit fully digitised archaeological field documentation, which is part of the archaeological research archive, and for the museum to import it into the IS. Recording and documentation in the IS ensures the integrity, authenticity, usability, accessibility and durability of the data or material. The level of recording is hierarchical, and there is a visible audit trail. Long-term e-storage is implemented at two levels, on a local server and externally hosted by service providers. On the local server, data is refreshed daily. In one of the museums, the data are recorded at fixed intervals on tapes, which are stored in the most secure part of the museum's depository (Bitenc, 1991, 20).

#### 4 CONCLUSION

A review of literature on the computerisation of archaeological research archives showed that the archaeological profession began to deal with this issue more intensely in the 1980s, when the need for informatisation and the establishment of basic databases emerged.

In the early 1990s, a proposal for a Project for the Formation of a Museum and Documentation Centre was drawn up to establish a national documentation centre (Grosman, 1991). Institutions developed their own IS, as the sectoral legislation, neither archaeological, archival nor museological did not have clear guidelines in the field of informatisation of the archive of archaeological research.

Archaeologists have pointed out the following problems: in 2013, the Ministry of Culture prepared guidelines for the capture, long-term preservation and access to cultural heritage in digital form (MK RS, 2013). In 2017, the Ministry of Culture started to actively address the rather urgent and chaotic situation in the field of informatisation of cultural heritage with the eHeritage project, a part of which is also eArchaeology (Kovačec, 2021).

This is also reflected in the snapshot of the current state of informatisation of the archaeological research archive. The article raises the issue of informatisation of the archaeological research archive and shows that many areas within it are still unresolved. In order to reach an optimal level, it is necessary to involve all three disciplines: archaeology, museum and archives, in the informatisation process. At present, the most unfinished business is in the field of archives. The latter, already at the primary level of archaeological field documentation (a part of the archive of archaeological research), is not actively involved, apart from finds and samples. However, it is indispensable for the proper validation and standardisation of the documentation. The same applies to the computerisation of the archive of archaeological research.

The survey showed that the state of informatisation of the archives of archaeological research is merely sufficient in the competent institutions, and that there is still much to be done in this area.

Many questions arise, e. g. the weaknesses of the number of IS in use, the non-uniformity of code lists, the possibility of integrating IS into a common central information system, the standardisation of processes, the adherence to ISO standards, the uniform technological requirements for capturing and storing material in digital format, etc., which will have to be answered in the future. This research shows that it is necessary to actively involve experts in the field of archives, who will complement the legislation at the primary level with their specific knowledge in the field of informatisation of archives and will be actively involved in the process of informatisation of the archives of archaeological research at the secondary level. In essence, it will be necessary to define the relationship between the archaeological research provider and the museum in terms of the creator–long-term e-repository. The archaeological researcher is the creator of the archaeological research archive. The museum plays two roles, on the one hand as the creator and on the other hand as the 'e-archive'. It will be necessary to legislate the adoption of internal rules for the capture and e-archiving for archaeological surveyors and museums. A number of things need to be done prior to this, such as an analysis of the current situation, the requirements for e-storage, an assessment of risks and mitigation measures, feasibility studies for e-storage and a plan for e-storage and the establishment of an IS for e-storage should be prepared (Hajtnik, 2011).

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TIPOLOGY: 1.01 Original scientific research