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Archaeological Data Archiving in Croatia

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Dealing with various aspects of archaeological research typically results in diverse and often very large datasets and, over the last few decades, primarily in a born-digital format. These data may be produced in many ways, but when we refer to archaeological data, we typically mean the primary data collected during various forms of archaeological fieldwork. Such data represent the primary information about fieldwork procedures and original archaeological contexts, while in the case of archaeological excavation, it serves as the sole remaining evidence of the contextual significance of archaeological features and finds. Therefore, it holds immense importance for archaeological heritage, and undoubtedly, the procedures for data archiving become the most vital prerequisite for its long-term preservation.

In Croatia, the legal framework for managing cultural heritage is defined by the Act on the Protection and Preservation of Cultural Objects. Simultaneously, archaeological activities are governed by the Ordinance on Archaeological Research, which, together with the Act on Museums, also regulates the archiving of field documentation. These regulations stipulate that, in addition to archaeological finds, fieldwork documentation must be submitted to a competent public museum institution. Consequently, museums bear legal responsibility for the archaeological documentation and its archiving. While Croatian museums have established long-standing and standardising procedures for collecting data on museum objects, no standards or guidelines have ever been established for archiving datasets created during archaeological fieldwork. Given the absence of a national digital data archiving system for archaeology, this article focuses on considering the factors necessary to establish an appropriate infrastructure for digital data archiving in Croatia.

1. Introduction

Over the past couple of decades, the vast majority of archaeological data has become 'born-digital' in Croatia, thanks to various digitization projects that have enabled the conversion of originally analogue data into digital form. As a result, the quantity of digital archaeological data has been rapidly and continually increasing,

making archiving one of the most important topics in archaeology. Digital data archiving is defined by its ability to provide continuous access, legibility, and usability with available or accessible technology. Thus, information is considered preserved as long as it is accessible, understandable and reliable (Ivanović 2010, 103; Costa *et al*. 2013, 450; Sirovica 2016a, 285). Well-designed digital archives not only facilitate long-term storage and preservation, but also enhance searchability and accessibility, ensuring intelligibility, reliability, and continuous use. Consequently, the goal of archiving is to maintain the usability of digital data through appropriate technological and organisational infrastructure (Kenney *et al*. 2003; Ivanović 2010; Sirovica 2016a). However, the establishment of such systems is very demanding and requires collaboration among experts from various fields in addition to significant costs.

Dealing with different aspects of archaeological research often results in diverse and sizable datasets. These data can be produced in many ways, through various forms of desk-based assessments, artefact analysis and data processing. They can also encompass a wide range of information including museum collections or the results of scientific analysis and laboratory procedures. However, when we refer to archaeological data, we primarily mean primary data collected by various forms of archaeological field investigations. These data represent the primary information about fieldwork procedures and original archaeological contexts, and thus are the prerequisite for further analyses and interpretation. Therefore, the preservation of archaeological data collected through fieldwork, particularly the documentation created during archaeological excavations, takes precedence in archiving procedures. Excavation is a destructive and unrepeatable process through which archaeological remains are permanently removed from the place of their original deposition, this makes the documentation that accompanies the process of this relocation the only remaining record of the original context and the sole evidence of the contextual significance of archaeological features and finds (see e.g. Novaković *et al.* 2007; Heinz 2014; Richards 2014; Green *et al*. 2016; Sirovica 2016a). Consequently, this documentation represents an exceptionally important part of archaeological heritage and appropriate archiving procedures undoubtedly become the most important prerequisite for its long-term preservation.

2. Legal Framework and Archaeological Data

Nowadays, it is widely accepted that the preservation of cultural heritage is the responsibility of the state (Kristiansen 1989, 25), and its fundamental requirement is the establishment of a regulatory management framework (Firth 1995, 49). Such a system entails laws, regulations, and guidelines pertaining to procedures for identification, evaluation, inventorying, protection, preservation, and conservation (McManamon and Hatton 2000, 6) as well as a developed institutional system for heritage management based on the established legal framework (see also Sirovica 2018, 11–15). The competent body responsible for managing cultural heritage in Croatia and overseeing the recording, investigation, documentation, monitoring and promotion of cultural heritage is the Directorate for the Protection of

Cultural Heritage of the Ministry of Culture (*Uprava za zaštitu kulturne baštine Ministarstva kulture*), along with its 22 regional units.

The legal framework for cultural heritage management has been defined by the Act on the Protection and Preservation of Cultural Objects. This law was adopted in 1999, and subsequently amended and supplemented 18 times, mainly to ensure compliance with European Union regulations, but also because of changes to the paragraphs related to concessions and concession approvals on cultural property. Cultural properties protected by the law are defined in Article 2 and include, among other things, archaeological sites and areas, landscapes and their components, as well as movable and immovable objects of archaeological significance. Although archaeological field documentation is not explicitly mentioned in the Act, Article 8 defines documentation on cultural properties as movable cultural goods. This implies that archaeological fieldwork records are directly protected by this Act as cultural property of the Republic of Croatia, and therefore, the state is obligated to protect, preserve, conserve, and maintain them. According to Article 6 of the same Act, the state is responsible for implementing measures that enable the extended preservation of cultural property, the systematic monitoring of its condition, protection against any threats, and undertaking necessary measures and activities for the protection of its heritage properties, integrity, and purpose as cultural property. Measures for the protection of movable cultural property are additionally prescribed by Article 59, which obligates the competent authority to establish a system of protective measures with general and specific conditions for the preservation, maintenance, and use of movable cultural property. Although this article comprises only one very general statement, the responsibility of the state and its competent institutions to ensure the long-term preservation of archaeological field documentation, including digital data as the most prevalent result of fieldwork today, can be recognised.

On the other hand, archaeological investigations are governed by Article 47, which stipulates that fieldwork can only be performed (with official approval that only the competent authority can issue) by persons and legal entities that meet the requirements of professional qualification (see also Radnje koje prethode arheološkom istraživanju). The same article stipulates the conditions under which the approved fieldwork is carried out, the deadline for report submission, as well as specifying the designated storage location for the collected archaeological material.

The archiving of fieldwork documentation is not explicitly mentioned, but another law, i.e. Article 11 of the Act on Museums, regulates this matter, and stipulates that in addition to archaeological finds, fieldwork documentation must also be submitted to a competent public museum institution. Consequently, museum institutions become legally responsible for the storage of archaeological finds and documentation, classifying them as museum material and museum documentation. This reaffirms the heritage value of archaeological field documentation and emphasises the significance of its long-term preservation as a matter of public interest, as highlighted by Article 8 of the same act and Article 98, the Act on the Protection and Preservation of Cultural Objects.

More detailed regulations on archaeological field documentation are covered by the Ordinance on Archaeological Research (*Pravilnik o arheološkim istraživanjima*;

Narodne novine 102/2010, 01/2020), which was enacted in 2010. This Ordinance defines archaeological investigations, establishes the licensing system, and outlines the conditions for conducting archaeological fieldwork (Sirovica 2016b, 250–51). Article 4 of the Ordinance defines archaeological documentation and its content, but does not provide standards for data collection or address the issues of analogue and digital data. Nevertheless, templates for textual documentation of archaeological excavations can be downloaded from the website of the Ministry of Culture of the Republic of Croatia. These templates mostly consist of table forms for recording data on archaeological features and finds. Since they can only be downloaded in Portable Document Format (PDF), it can be inferred that they are primarily intended to be printed and manually completed on paper, rather than as digital data.

Under the provisions of the Ordinance (Article 16), upon completion of the investigation, the authorised person must submit a report on the work conducted and the results obtained. The report is submitted to the competent regional authority and must contain basic measurements and a selection of photographs. As the central administration collects only a summarised version of the report, the responsibility for archiving is delegated to the 22 regional offices, with each office handling reports within their respective areas of responsibility. This decentralised archiving approach highlights the dependence on individual office capabilities, and the lack of both standardised archiving systems and a central level of quality control for submitted documents. Consequently, this practice obstructs, hampers or even prevents access to the data, which is the only data actually collected and archived within the framework of the official regulatory system. On the other hand, Articles 17, 18 and 19 of the Ordinance, outline the content of the report, albeit in a partially and broadly-defined manner. Since the format in which the report is not specified, it may still be archived only in paper form. Nonetheless, archiving in the competent regional office provides additional protection under the Ordinance on the conditions, method and procedure of documentation storage and use, although it should be noted that this regulation primarily focuses on the archiving of analogue rather than digital data.

Recognizing the growing significance of data availability, the Directorate for the Protection of the Cultural Heritage took a positive step in 2004 by initiating the publication of summaries of fieldwork reports in the Croatian Archaeological Yearbook (*Hrvatski arheološki godišnjak*). While some delays may occur (the latest publication includes data from fieldwork carried out in 2016), these yearbooks offer valuable insights into recent archaeological investigations, providing at least basic data from the fieldwork which are widely accessible. The shortcomings typical of this type of information transmission could be partially overcome through data entry on the Fasti Online Portal. Although still in its infancy, this project is a collaborative initiative involving the Directorate for the Protection of the Cultural Heritage, the Archaeological Museum in Zagreb, and the Associazione Internazionale di Archeologia Classica (AIAC).

3. Museums and Archaeological Data Archiving

The legal framework mandates that archaeological finds and field documentation be submitted to the designated competent public museum institution for permanent storage. Consequently, archaeological finds and documentation become museum material and museum documentation, i.e. cultural property of the Republic of Croatia. In accordance with Article 8 of the Act on Museums, Article 21 of the Ordinance on Archaeological Research stipulates that submission is carried out within two years of the conducted fieldwork i.e. after the expiration of the right to the first publication of finds and documentation.

In Croatian museum practice, the collection of data on museum objects is an established and long-standing procedure. The archiving of digital data on objects has been in development since the late 1990s, with some successful implementation of international guidelines and standards. However, no system for archiving records generated during archaeological fieldwork has been established. There are no standards or guidelines regarding the method and scope of storage, data types and formats, data organisation levels, or suitable storage systems and media. Furthermore, by delegating data archiving to the competent museum institution, the responsibility shifts to the regional and institutional level without the establishment of a central supervisory and control system.

Consequently, data archiving is solely dependent on the potential of individual institutions and the knowledge, skills and commitment of their staff. Under Article 4 of the Ordinance on professional and technical standards for determining the type of museum, their activities, and the storage of museum objects and museum documentation, designated museums for permanent storage of archaeological finds and documentation can vary significantly. They may be classified as general, specialised, national, regional or local. As a result, it is unrealistic to expect that all institutions, regardless of their type, jurisdiction, funding sources, number of employees, or level of expertise, can provide identical conditions for archiving this primary set of fieldwork data.

Many of these institutions lack suitable equipment for data storage, as well as the necessary archaeological, archival, or IT expertise. As a result, the quality of data archiving inevitably varies considerably. Additionally, assigning data archiving to institutions that lack control over the quality or the available mechanisms for sanctioning non-compliance with established standards, hinders any content monitoring system. When combined with the absence of standardised and supervised archiving systems, it is inevitable that constant and significant data losses will occur.

4. Data Archiving and Access

Highly sophisticated systems for digital data archiving are essential for the long-term preservation of data, access to data, and future reuse of data. These factors are fundamental to all archiving procedures, as the systematic archiving of data collections can only be justified by their reuse. The significance of open access, which increases the potential user base, is emphasised in numerous international documents, directives, charters and guidelines. Croatia has recognised the importance of the development of digital research infrastructure for the humanities for some time (MZOS 2016). Just as in other European countries, the policy of open access has become the driving force behind the development of data repositories. Such goals are supported by various institutional repositories within the system of libraries, archives and especially academia, which have been developing since the 1990s (Hrvatska znanstvena bibliografija; CroRIS; see also Pintarić 2020, 34), and which, even today, follow contemporary advancements to enhance and expand the field of digital data archiving. However, archaeological data in Croatia, including digital documentation of archaeological fieldwork, is not yet covered by these procedures. This is the result of a noticeable lack of awareness of the importance of systematic archiving of fieldwork archaeological data, a mindset that predates the emergence of digital technologies. Consequently, only a few recent studies acknowledge the significance of developing a system for archiving digital archaeological data and making it accessible to the public (e.g. Pintarić 2020). The establishment of such a system is further hampered by the absence of explicit legal regulations governing archiving procedures and data access methods. While no one denies that fieldwork data is an extremely important element of cultural heritage, the responsibility for its preservation is often left to institutions that lack sufficient financial, IT technological support, and necessary expertise.

In addition to the absence of standards and guidelines, and a quality control system, the long-term preservation of digital data in Croatia relies entirely on the efforts of individuals and individual institutions, as well as on activities carried out within specific projects. Although these projects can be valuable attempts to collect, store or publicly release data, they are limited by their dependence on short-term project funding and cannot serve as a suitable means to develop systems that ensure permanent repositories or provide long-term access to this type of data.

Achieving systematic archiving of digital data collected through archaeological fieldwork requires state support, a legal framework, and a clear national strategy aiming to establish an institutional system responsible for data archiving and preservation. This system should provide the necessary technology, create the appropriate infrastructure, and institute a quality-control system based on predefined standards. The primary goals of such a procedure would be to enable the long-term preservation of primary archaeological data, and create easily accessible digital content that facilitates the use of archived data. Accomplishing these goals necessitates amending legal regulations to explicitly recognise the importance of developing a suitable digital data archiving system aligned to international standards. Establishing a central infrastructure that defines general standards and guidelines for data collection and archiving, along with an efficient quality control mechanism for archived content, would be essential.

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