

## DIAMOND OPEN ACCESS AND RESEARCH INFRASTRUCTURES: THE INVOLVEMENT OF «ARCHEOLOGIA E CALCOLATORI» IN THE H2IOSC PROJECT

### 1. INTRODUCTION

«Archeologia e Calcolatori» (A&C) is a peer-reviewed scientific journal that adheres to the Diamond Open Access model, providing free and unrestricted access to its content without any fees for either authors or readers. The journal's digital history began in 1995 when the first version of its website was created on the occasion of the 3<sup>rd</sup> *International Symposium on Computing and Archaeology* held in Rome (MOSCATI 1996). A significant milestone was reached in 2005, when A&C began publishing articles online in PDF format. This pioneering decision, made just two years after the 2003 Berlin Declaration on Open Access, marked a significant shift in the journal's editorial strategy. As a result, A&C became one of the earliest adopters of this open access approach, well before the term Diamond Open Access was formally introduced.

The journal regularly publishes articles that explore the state and development of open access scholarly publishing, with particular attention to journals in the field of antiquities. Its mission is to promote publication models that are accessible, sustainable, and uphold high scientific standards. The reflections presented in this paper are enriched by the experience acquired through the H2IOSC project, which has enabled the growth of the editorial team, fostering interdisciplinary collaboration among professionals with diverse skills. This has also led to stronger integration between A&C's data, research output, and the principles of Open Science.

These reflections are part of a broader discourse on publishing practices and the dissemination of research, issues that have become central to the policy agenda of the Italian National Research Council (CNR), which actively supports the transition toward open and accessible publishing models. Today, the Diamond Open Access model stands out as one of the most advanced approaches in academic publishing, ensuring unrestricted access to content while preserving the scientific autonomy of journals. Nevertheless, this model also presents significant challenges particularly regarding financial sustainability, the effective organization of editorial workflows, and the maintenance of high-quality standards.

### 2. DIAMOND OPEN ACCESS AND ITS SPECIFIC FEATURES

Scientific knowledge thrives on exchange, communication, and collaboration; without these elements, progress risks becoming fragmented and limited.

As early as the 1990s, Anne-Marie Guimier-Sorbets reflected on the new opportunities offered by the digital dissemination of data, identifying within the pages of *A&C* the key phases of the cognitive process in archaeology: the collection of information, its processing and interpretation, and, finally, the broad and shared dissemination of research results (GUIMIER-SORBETS 1999). Archaeology, by its very nature, advances through comparison and correlation of data from different sources. In this regard, the advent of the Internet marked a turning point, greatly expanding access to information and enhancing possibilities for interaction and collaboration among scholars. Although the concept of Open Science had not yet been formalised in the 1990s, the principles outlined by the French scholar anticipated many of the needs and aspirations that would later be fully articulated in the Open Science paradigm.

Open Science is founded on transparency and knowledge sharing, with the aim of making research processes more accessible and democratic. Today, scholarly communication is rapidly moving toward the widespread adoption of Open Access as a standard practice for disseminating scientific results. In recent years, academic publishing has experienced a significant growth in open access publications, while also prompting reflection and debate on various issues including funding models, digital infrastructures, the use of metadata and technological tools, the definition of quality standards, and the long-term sustainability of open access resources. Currently, economic models for covering publishing costs mainly rely on two approaches: public funding and article processing charges (APCs). Among these, the Diamond Open Access model emerges as an inclusive solution, as it enables academic publishing without imposing costs on either authors or readers, thanks to the support of academic institutions, public agencies, and research consortia (PERUGINELLI, FARO 2023).

At the European level, two major initiatives have been undertaken to support and monitor the Diamond Open Access model. The first is the Open Access Diamond Journals Study (OADJS: <https://zenodo.org/records/4558704>), commissioned by cOAlition S and Science Europe to the European research infrastructure OPERAS (<https://operas-eu.org>), with the aim of analysing the Diamond publications ecosystem. The second is the Action Plan for Diamond Open Access (<https://doi.org/10.5281/zenodo.6282402>), elaborated in 2022 by Science Europe, cOAlition S, OPERAS and the French Agence Nationale de la Recherche, which identified four fundamental pillars for the development of the model: efficiency, quality standards, capacity building and sustainability, indicating a set of best practices to support Diamond Open Access journals in their path of growth and consolidation. In particular, a critical aspect of this type of publication is its economic sustainability. The maintenance of Diamond journals relies on a heterogeneous and often unstable combination of resources,

including various forms of institutional funding and grants from projects that are typically of time-limited. This dependence on potentially fluctuating funding sources underscores the need for a more stable financial model. One potential solution has been identified in the development of a system where costs are shared equally among a network of institutional stakeholders, thereby ensuring the continuity and long-term growth of the model (PERUGINELLI, FARO 2023). Also funded under Horizon Europe, the three-year DIAMAS project (2022-2025), which aims to strengthen the Diamond Open Access ecosystem in Europe, was launched in July 2022. Its goal is to «raise the standards of academic publishing, improving its quality and promoting the sustainability of a diverse publishing landscape» (<https://diamasproject.eu>).

The humanities are increasingly adopting the Diamond Open Access model for research publication, a trend that is particularly evident in the field of archaeology. An analysis of open access journals indexed in the Directory of Open Access Journals (DOAJ; <https://doaj.org/>) shows that, as of April 2025, 169 out of a total of 197 journals categorized under the subject ‘Archaeology’, operate without publication fees (‘without fee’). A closer examination on a geographical level reveals variations across different national contexts. Specifically, focusing on four European countries closely monitored by A&C, Italy, France, the United Kingdom, and Spain, it becomes clear that only in the United Kingdom is there a significant presence of journals adopting the Article Processing Charges (APC) model. For example, the periodical «Internet Archaeology», one of the first digital open access journal in this field, which since its establishment has been able to exploit the multimedia potential of electronic publishing in an innovative way, follows an APC model. This characteristic is part of a broader context that defines the open access panorama in the UK, where there is a positive approach to open access publishing, albeit with a predominance of paid models (PERUGINELLI, FARO 2023).

### 3. DIGITAL ARCHAEOLOGY IN A&C

Over the past five years (2020-2024), A&C has experienced a significant increase in its scientific output, expanding from a single annual issue to two issues per year. This growth reflects the rising interest of the scientific community and the journal’s consolidation as a key reference point in the field of computing archaeology, both nationally and internationally. In addition to articles focused on specific research projects, the journal has also hosted the proceedings of important conferences, including the ArcheoFOSS workshops (BOGDANI, COSTA 2023; MARRAS *et al.* 2024), annual events that bring together a broad community of scholars engaged in the development, monitoring, and dissemination of open-source tools, with the goal of promoting data accessibility and knowledge sharing.

Thanks to the volume of contributions and the diversity of topics covered, A&C has consolidated its role as a privileged observatory for the critical analysis of theoretical and methodological developments in the application of computer science to archaeology, in all its different forms. The analysis of the subjects addressed in the published papers enables the identification of key ongoing research trends, outlines emerging directions, and highlights their connections with previous scientific discourse, while also tracing insights into potential future developments (MOSCATI 2021).

In recent years, particularly within the field of information technology, photogrammetry and three-dimensional modelling have become increasingly central to archaeological research and practice. This growing importance is largely due to technological advancements that have produced faster and more accurate tools for documenting and reconstructing antiquity. Moreover, there has been a growing interest in visual data, not only as a mean of representation, but also as a critical component in the analysis and interpretation of archaeological contexts (CARAVALE *et al.* 2023). The GIS sector, with its long-standing tradition, continues to be well-represented, benefiting from recent developments through projects that use geographical locations as access points to information (cf. e.g., GNA: ACCONCIA *et al.* 2024). These initiatives also make use of digital tools, such as online gazetteers, which transform places into Linked Open Data, promoting interoperability and facilitating information sharing. By contrast, research areas that were prominent in the early years of the journal's publication (MOSCATI 1999), such as databases and mathematical-statistical methods, are now less represented. While these tools remain essential for the analysis and management of archaeological data, they are increasingly embedded within broader methodological frameworks where interoperability, advanced visualization, and geospatial data play a central role. At the same time, the field of Artificial Intelligence remains underrepresented (cf. e.g., CACCIARI, POCOBELLI 2021; BUSCEMI *et al.* 2023), despite its growing application in archaeological research. It is expected that AI's role in data analysis and interpretation will continue to expand, with greater representation in future issues.

#### 4. A&C IN H2IOSC

As previously highlighted, one of the main challenges facing Diamond Open Access journals lies in ensuring their long-term sustainability. In recent years, A&C has benefited from the support of the Institute's leadership, which has identified Open Access as a strategic priority. This commitment has led to the establishment of a dedicated team within the ISPC research groups. The journal's growth and development have also been supported by the involvement of the multidisciplinary research group surrounding A&C in the

H2IOSC project, through various forms of collaboration and engagement. This synergy has strengthened the journal's activities, broadened its scope, and enhanced its potential scientific impact.

In fact, the journal's activity extends beyond the scientific and editorial management of articles to be published. Over the past few years, it has evolved into a broader operational framework aimed at monitoring and developing digital collections of open and interoperable data, while also promoting open access policies for scientific information in the humanities (CARVALE *et al.* 2021). These goals are fully aligned with the objectives of the H2IOSC project, which aims to enhance the dissemination of scientific knowledge through the adoption of open standards and innovative sharing practices.

With 35 years of publication, A&C offers a rich heritage of digital textual, visual, and bibliographical content, documenting the evolution of the discipline from its origins to its current expansion. To further increase the availability of open resources for the scientific community, expand their interoperability, and enhance their searchability, efforts have been made to improve all three types of digital data and make them more accessible. As regards texts, since A&C is a privileged observer of new trends in information technology applied to archaeology, the data collected in recent published articles have been used as the basis for the landscaping of digital resources in the field of Cultural Heritage/Heritage Science. This work has resulted in the development of the DHeLO web app (<https://dhelo.cnr.it/>), in line with the objectives of the H2IOSC project (MANCUSO, D'EREDITÀ 2023). In this context, the restructuring of the DHeLO platform as a Linked Open Data environment (MANCUSO, in this special section) opens up new possibilities for the semantic enrichment of texts published in A&C. Specifically, the platform could be used to link concepts, data, and portals mentioned in the articles with the digital resources catalogued in DHeLO, thereby enhancing the interoperability between textual content and structured data in the field of computational archaeology; fostering an approach that would add value to the journal's existing knowledge base, while improving the semantic navigability and usability of its contents.

In addition, the recently redesigned A&C website offers a more intuitive and accessible graphical interface, making it easier to search within the repository. The platform has been optimized to take full advantage of the potential offered by the journal's relational database, increasing its semantic interoperability. Future goals also include the conversion of article texts into HTML format, allowing them to be displayed directly on the web page instead of the current PDF preview (PARACIANI 2024), as well as the expansion of the number of published datasets (see, for example, CARDARELLI 2023).

With regard to visual resources, as previously noted, part of these materials is collected in a dedicated database, IADI (<https://iadi.archcalc.cnr.it/>),

which includes images published between 1990 and 2020 (PARACIANI, ROSSI 2023). Since 2020, the iconographic material, along with 3D models when available, has been made directly accessible through the journal's website. The metadata of the images, initially organized according to the Dublin Core standard, have been further enriched through an extensive work made possible by a collaboration with Spoke 8 of the PNRR Changes project 'Cultural Heritage Active Innovation for Sustainable Society'. This collaboration led to the development of a controlled vocabulary for images types and subjects, based on international reference models, particularly the Art&Architecture Thesaurus of the Getty Research Institute (AAT) (BUSCEMI, FAZIO 2024). The adoption of international standards for image metadata has also provided the basis for an ongoing initiative aimed at integrating these digital resources into Europeana (<https://www.europeana.eu/it>), thereby expanding the dissemination and accessibility of the journal's visual heritage at the European level. This integration aligns with A&C's already established presence in the same digital library, which currently hosts the repository of articles.

Regarding the bibliography, an extensive effort has been undertaken, leading to the creation of a database using Zotero software, containing over 10,000 titles, which, due to the breadth and heterogeneity of information, serves as a key reference for digital archaeology studies (MANCUSO, D'EREDITÀ 2024). Textual, visual, and bibliographic data are also incorporated into the Open Digital Archaeology Hub (<https://open-archaeohub.cnr.it/>; CARAVALE *et al.*, in this special section), which, by prioritizing geographic access to information in line with current trends in digital archaeology, seeks to provide a structured and interoperable research environment. Once again, this is an open system, designed to accommodate other similar data collections and, at the same time, be integrated into larger platforms such as the Geoportale Nazionale per l'Archeologia (<https://gna.cultura.gov.it/>), with which potential synergies for interoperability and resource sharing are currently being explored.

Support for the journal is therefore confirmed as crucial not only for continuing the long and prestigious editorial history of A&C, but also for encouraging the emergence of new initiatives and promoting the principles of Open Science, thereby ensuring greater accessibility and enhancement of archaeology's digital heritage .

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## ABSTRACT

«*Archeologia e Calcolatori*» (A&C) is an open access scientific journal that follows the Diamond Open Access model, ensuring free access to its content without any charges for authors or readers. One of the main challenges of this model is ensuring the long-term sustainability of the journals that adopt it. The consolidation and growth of A&C over the past two years have been supported by the involvement of the multidisciplinary research group surrounding the journal within the H2IOSC project, through various forms of collaboration and engagement. This synergy has contributed to strengthening the editorial initiative and its related activities, expanding its scope and potential scientific impact through the enhancement of its textual, bibliographic, and visual resources.