

# Archaeological digital repositories: Fostering networks from the Global South

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## ABSTRACT

*This chapter considers the role of computing and digital media in archaeology in Argentina. It describes the current state of the art regarding the use of digital methods (for creating, analysing, storing, retaining and reusing data, and as a means of communication amongst various interest groups). PAD, the Digital Archaeology Program of the Museum of Anthropology (IDACOR) is presented as an example of actions taken by public state agencies, including universities, research centres and scientific bodies. Finally, we discuss how PAD has become a game changer in digital archaeology, fostering national and international networks.*

**KEYWORDS:** Digitization; Thematic repositories; Argentina; Programa de Arqueología Digital; Digital Public Archaeology.

## Introduction

Archaeology is about studying the past: a past that may seem so far away that it may resemble, as Lowenthal (1995) suggested, a foreign country, or a very recent past, moments before the present. Although the past and how people interact with each other and their environment has always been one of our main interests as archaeologists, the way we approach it becomes everyday more sophisticated and hi-tech. As Zubrow (2006, 11) has said 'technology is a tool to control nature, and archaeologists – similar to other workers – use their new tools to find and control the past'. In other words, archaeologists need modern tools to build new narratives of the past. However, what are these modern tools? Computers may be the answer, but they have been around for more than 40 years now (e.g. Costopoulos 2015; Dallas 2015; Evans and Daly 2006). Therefore, it seems that it is not the hardware itself that will improve archaeological research but the long-lasting growth in processing capacity added to network connectivity.

As soon as computers became available, archaeologists incorporated them into their professional practice. Digital catalogues and databases built from registers of diverse material culture attributes allowed more accurate seriations, organization of items and finally the classification of object similarities (and therefore cultural affinities). As the capacity of computers grew, just as their cost went down, the use of these technologies became more widespread (Evans and Daly 2006). Many tasks that had required much effort became easier when mediated by the use of computing. Spatial analysis, various types of quantification (zooarchaeology, lithic studies, etc.) and the use of statistics led to the creation of various specialisms within the discipline. Quantitative archaeology, spatial archaeology, and virtual archaeology benefited and even originated from the use of computers, different types of software, and especially the connectivity and mobility achieved in recent years.

These technologies also allowed faster communication of archaeological results. In addition, information and communication technologies (ICT) were used to communicate with different publics (e.g. Richardson 2013). In recent years applying for grants, publishing papers or presenting technical reports are only possible in electronic format. The means used for the dissemination, teaching or mere transmission of archaeology were also subject to this digital revolution (e.g. Evans and Daly 2006; Izeta and Cattáneo 2018). The greater ease of access to digital technologies increased the content related to archaeological subjects. Video games based on archaeological topics, films and documentaries made by research teams, independent producers or state agencies began to proliferate, and there has been an increasing presence of web pages, Facebook pages, Twitter or Instagram accounts referring to research teams scattered throughout the country (see Izeta and Cattáneo 2018; Morgan 2016).

In this instance, where we see an accelerated use of computing and digital media we believe it becomes necessary to consider their role in the modelling of our practice as archaeologists and how they connect us with a public interested (or not) in archaeology. Here we need to ask ourselves if we need to be reflexive about 'the digital'. In this sense, what is the role that 'the digital' plays in mediating between archaeologists and non-archaeologists? This question can be answered if we think of the digital as synonymous with Internet-mediated (Boellstorff 2012) and we can paraphrase and say that all archaeology is digital archaeology in one way or another. In fact, we must consider whether there is an ontological transformation or change as proposed by Kockelman (2013) in the sense of the software algorithms (hidden and unknown to the vast majority of users) that silently guide our professional practice. In this context, Richardson (2013) asked whether it is possible to speak of a Digital Public Archaeology, understanding it as the way professional archaeologists adopt to communicate the results of archaeological knowledge to those considered non-archaeologists, in this case through digital media. This question becomes significant when considering that this is a relatively new dimension of contemporary practice and has not yet had much theoretical analysis (Richardson 2013).

To answer it, we must recognize that very early in the disciplinary development of archaeology different ways of communicating the results of explorations, excavations



and the analysis of archaeological material were considered. In fact, one of the first ways to present findings to the community of non-experts was made by the 17<sup>th</sup>-century European museums, which displayed diverse archaeological objects (e.g. Musée du Louvre, Musei Vaticani, Uffizzi di Firenze, British Museum, etc.). Their growth in the last quarter of the 19<sup>th</sup> century has undoubtedly left a mark on the relationship between those who manage the dominant discourse and those who receive it (e.g. Farro 2016; Kristiansen 2012; Podgorny 2009).

More specifically in the early 1970s the first to use the same computer resources applied to archaeology were the same manufacturers (Vanhoutte 2013) who published guidelines on how to use computers, with repercussions for diverse local archaeologies. Examples include the implementation of a computer methodology that aimed to define chronologies for the Argentinian Northwest (Lahitte 1970) or the implementation of semi-automatic lithic artifact classification named TILCO and DELCO (Bellelli et al. 1985–1987; Guraieb and García 1985–1987).

Undoubtedly, from these first contacts between computer science and archaeology, digital records were created of interest for both archaeological research and public interest. However, what happened to these primary data? Obviously, the obsolescence of the equipment, the advance in software programming and the proliferation of networks have made many of these systems inoperable today. As an example, McDavid (2004) presents in her analysis of the use of the internet in the practice of public archaeology some obsolete internet browsers. She also characterizes relationships among different actors through discussion forums, static web pages, collaborative web pages, and more. Just fifteen years ago, McDavid failed to foresee the emergence of social networks and mobility in the use of data, including the proliferation of applications (apps) in mobile devices of diverse formats, from notebooks to tablets, to smartphones. Of course, we also do not know what technologies will be in use in the next fifteen years, but if we understand that changes and innovation will occur, then being reflexive on this type of archaeology practice must be continuous. In this sense, various theoretical developments such as Digital Humanities (Huggett 2012, Terras et al. 2013), the 'Humanidades Digitales' (Rio Riande et al. 2015) or, more generally, digitization and digital sciences (Lauzikas 2007) take on a leading role.

We will try to see how these developments have affected practices within Argentinian archaeology and how it has been influenced by international experiences. We begin with a subject of particular interest to the discipline: the conservation of objects studied by archaeologists and by researchers in the humanities and social sciences in general. In the 1970s the idea appeared of transforming physical objects into digital objects through their description mediated by a set of metadata. With this began the digitization of collections, supported by museums around the world. One of the pioneers was the British Museum through its digital catalogue and it and other institutions focused on trying to define controlled vocabularies and sets of standardized metadata for the management of these large inventories, such as the Getty vocabularies or the UNESCO thesaurus, amongst others.

## The 'digital' in Argentinian archaeology

In Argentina, interest in this type of initiative began in the humanities. In the early 1990s projects from the Ravnani Institute of the University of Buenos Aires Digitization Center (Feldgen et al. 2002), the Library of the Faculty of Humanities of the Universidad Nacional de La Plata (Borrel et al. 2015) and other various historical archives of universities and official bodies are good examples. Perhaps the NAYa (Noticias de Antropología y Arqueología, Anthropology and Archaeology News) initiative, created in 1996, was at the time the most innovative in its use of the internet as a means of disseminating archaeological advances.

In any case, the history of the computerization of archaeological collections began long before the governing bodies of science and technology in Argentina became interested in this subject. Towards the end of the 1990s, three institutions began to implement this type of initiative: the Ethnographic Museum (Facultad de Filosofía y Letras, Universidad de Buenos Aires), the Institute of Archaeology and Museum (Facultad de Ciencias Naturales e Instituto Miguel Lillo, Universidad Nacional de Tucumán), and the Museum of Anthropology (Facultad de Filosofía y Humanidades, Universidad Nacional de Córdoba). All these initiatives led to products that facilitated collections management, generally focussed on complete artifacts and, in several cases, created a digital catalogue.

On this basis, the development of facilities dedicated to the digitization of collections of scientific interest began to be defined in three institutional spaces that over time provided infrastructure, methodologies and training to various digital initiatives: the National System of Digital Repositories – SeCyT (Secretary of Science and Technology), the PLIICS-CONICET (National Research Council Interactive Research Platform for Social Sciences) (Izeta and Cattáneo 2018; Leff and Pluss 2015; Pluss and Leff 2013) and the Open Access and Digitization Program of Collections in Social Sciences and Humanities-MINCYT (Borrel et al. 2015). In particular, PLIICS has promoted the development of capacity at the individual and institutional level for the creation, use, storage, stewardship, preservation and dissemination of digital data generated by archaeological projects.

Following this intermittent progress towards digitization, and in line with the implementation of PLIICS, we began the project 'Support for the computerization of documentary archives and collections of the IDACOR-Museum of Anthropology (FFyH, UNC), CONICET':

After years of experience in the design and implementation of a technical repository, our interest is focused on recognizing the need for interaction with other repositories and institutions that develop these processes. A search for possible partners was undertaken and the ADS (Archaeology Data Service, UK) appeared as a potential collaborator, which ultimately allowed us to get involved in international projects such as ARIADNEPlus. This e-infrastructure will enable us to link our data to others



around the world, opening up access to Argentine data, and allowing cross-search and support for the development of our repository.

Furthermore we were able to position the digitization and computerization of archaeological collections as the area inside the institution receiving the highest funding (proportionally even more than the research area), based on the grants received from various non-governmental organizations such as the Williams Foundation, Bunge and Born Foundation–CONICET and federal funding by PLIICS–CONICET. As a by-product, training in the creation of digital data for use by archaeologists and non-archaeologists was also achieved.

All of the above, along with the concepts of open source software, open access, and open science (Willinsky 2005), has provided the first opportunity to publicly make available not only archaeological interpretations: the dominant message, but also the primary material (the 'raw' and unprocessed data, if such exists) from which the discourse of professional archaeologists is generated. This arrives in time to begin a process of democratization of science and knowledge, although we admit that this will not reach everyone as the infrastructure and resources to access technology is not available to all individuals (see McDavid 2004; Richardson 2013). In any case, preserving these digital data and the channels of communication and the results generated in the interaction of the different actors involved will allow the construction of a corpus of information accessible to those interested in these issues.

### **Suquía: The archaeology digital thematic repository**

As noted above, the use of digital data by archaeologists is now an everyday task (Costopoulos 2016). However, a lack of a digital approach in Argentinian archaeology has been identified. That is why, based on experience in projects focused on this problem, the Digital Archaeology Program of the Anthropology Museum (PAD) was formed in 2015. The goal of the PAD is to cover a vacancy within regional archaeology that has to do with the need to generate, preserve and disseminate archaeological data in digital format. For this, we rely on an important volume of digital objects like data and metadata from archaeological objects and complementary material associated with them (field notes, notebooks, publications, among others). At the same time, an important component of this type of practice is the use of all available resources to achieve communication between digital data generators and consumers. Therefore, the PAD can be found in various digital spaces (mainly internet) such as social networks (e.g. Facebook, Twitter, Instagram), digital institutional repositories, and web pages (static and dynamic). It should be noticed that these resources are used by various research teams including Arqueología de La Pampa Norte, Patrimonia, Arqueología de la región del Salado, Proyecto Arqueológico Miriguaca, Arqueología de Ambato-UNC and Proyecto Arqueológico Ongamira, among other Argentinian examples. In most cases these spaces are used to present news, introduce the professional group and provide some contact information. At this point it is remarkable how in the last year the interest in digital formats has advanced within the discipline, either as a

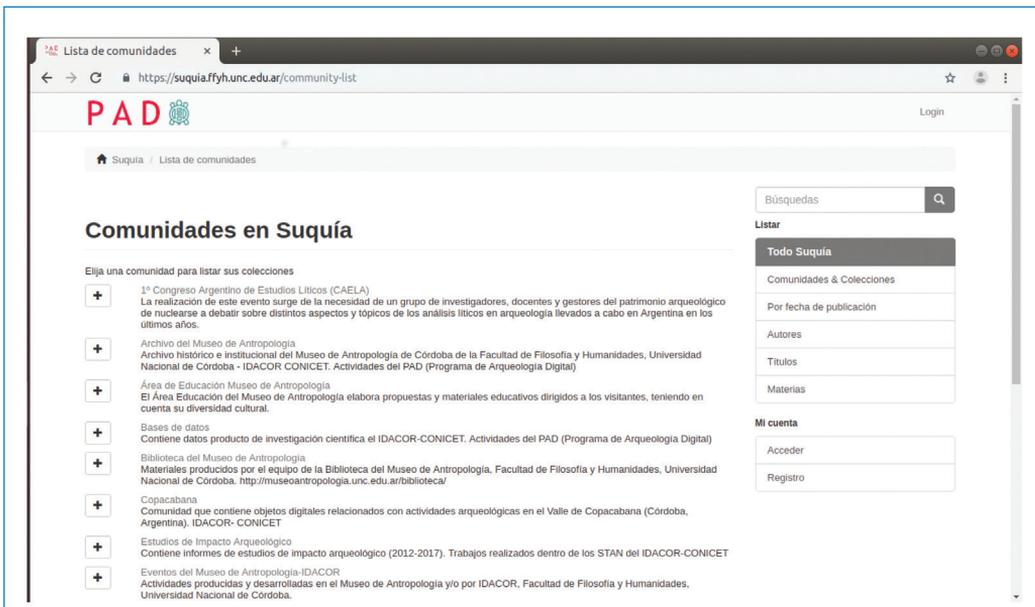


Figure 1: Snapshot of the Suquia Repository Online Public Access Catalog (OPAC). Some of the communities are shown.

means for communication (following the model of the ‘authorized heritage’ discourse or ‘top-down’ model as defined by Belford 2013) or as a means by which to generate new archaeological knowledge.

However, the existence of archaeology digital thematic repositories has not yet been widely developed in Argentina and general in South America. However, this kind of infrastructures exists in other countries like the Archaeology Data Service (ADS, UK; Richards 2017), the Digital Archaeological Record (tDAR, USA; Kintigh 2006) and Open Context (USA; Kansa 2010) among others (see Meghini et al. 2017).

In the framework of an Open Science project, the accessibility of primary data is of fundamental importance. In this sense, having adequate means becomes indispensable, which is why in 2016 an Institutional Digital Repository was created focusing on archaeology known as Suquia.<sup>1</sup> This was built according to the FAIR principles (Findable, Accessible, Interoperable, Reusable). Therefore, we chose a series of repository attributes such as the use of a universal metadata scheme (Dublin Core), free software with an active support community (DSpace) and compliance with the requirements of national laws regarding the deposit of primary data.

The Suquia Repository contains various types of information that have a common feature: difficult access by the community in their original format. Databases, reports, presentations at scientific events, images of excavations, and images of archaeological collections, are just some of the data types contained in the repository. Among

<sup>1</sup> <https://suquia.ffyh.unc.edu.ar/>



these are collections such as the Heritage Reserve of the IDACOR - Museum of Anthropology which hosts collections of several Argentinian regions such as the Northeast, Patagonia, Córdoba and the Northwest, among others; the Publications of the Institute of Archaeology, Linguistics and Folklore and the Institute of Anthropology; and those of archaeological sites or areas worked by current projects (e.g. Alero Deodoro Roca Sector B; Parque Natural Ongamira 1; and Copacabana). There are also a variety of other digital objects that correspond to spreadsheets, photos, text files, GIS files, inventories, databases, manuscripts, posters, brochures, books (in their various stages). To date there are over 2000 digital objects available under Creative Commons licenses for use and reuse both for archaeological research and for those interested in the subject.

### **An Argentinian repository federation**

Given the above scenario, our next goal was to transfer our experience to different Argentine institutions to build a network that connects these repositories. PLIICS and other programs, together with private foundations, are encouraging the creation of new repositories, which will eventually lead to a consortium or Federation of digital repositories oriented to archaeology. Fifteen institutions representing the entire Argentinian country are involved in the creation of this network, as suggested by the authors along with Julian Richards of the ADS in a meeting held in CONICET in October 2017 where a number of archaeologists, science managers, and members of the third sector discussed this topic. The Digital Archaeology Program together with the Williams Foundation and CONICET (National Research Council of Argentina) have begun working on a program aimed at generating interest in repositories, offering the possibility of generating new spaces or including new data in those already available. This task has just begun, but it seems to be promising and, without a doubt, the way of seeing, using and preserving archaeological data has changed at the national level.

In this same line, inclusion in other networks beyond South America has been achieved, including ARIADNEplus. In this case, we are also the only representatives of Latin America. However, we believe that this situation of uniqueness is a challenge to overcome and with it, we can offer a geopolitical vision for archaeological data from the global south. In other words, we can make the production of knowledge and archaeological theory visible from the periphery of the academic world.

### **Digital repositories and public outreach**

As for digital archaeology as public archaeology, it should be noted that according to Bonnin (2015), the development of public archaeology in Argentina has been consolidated in recent years. This is undoubtedly true in some academic institutions and research centres. However, in order to measure how developed this is within archaeology, a survey was undertaken of the subjects applied for in the last three CONICET national calls. We assume that this represents the current topics of interest for active

archaeological researchers. The result is that less than 6% of the applications are related in some way to Public Archaeology. However, if we reflect on the definition of public archaeology (e.g. Merriman 2004) in which we must assume that all Archaeology is public (as we proposed above that all archaeology is digital) then only a very small portion of archaeologists define or implement projects or actions aimed at this disciplinary field. However, we should notice this type of practice and approach from archaeology has been implemented relatively recently in Argentina (Salerno et al. 2016). In fact, much of the development of public archaeology is due to local issues: the relationship between archaeologists and communities (in the broad sense, but also specifically aboriginal communities); the transfer of archaeological knowledge through formal and non-formal education; the need to intervene in archaeological impact studies; and, the need to use new forms of dissemination based on the interrelation with diverse interest groups. Fabra et al. 2015 identify key issues for public archaeology in Argentina: education, heritage, treatment and restitution of human remains, rescue archaeology, multivocality (Community archaeology?), Sociology of archaeology, tourism and archaeology, among other topics. However, in all this analysis it is not possible to find references to the role of digital media (recording, conservation, communication) in the construction of these themes.

However, the rise of archaeological digital repositories is becoming a game changer, especially as new ways of networking at the national and international level are available. In this respect, ARIADNEPlus is laying the foundations for Argentinian archaeologists to start practising different modes of thinking and doing archaeology from a global perspective.

## Conclusion

Undoubtedly, the new field that opens up within archaeology will demand more development, both in practice and in reflexivity on the theoretical aspects that underlie it. However, the current reality reveals an active community that is generating digital information and is eager to share it. In fact, a survey carried out within the framework of the PLIICS in 2012 showed that of 730 Argentinian researchers from the social sciences and humanities 61% have digitized the primary data product of their research. Of this same sample, 87.5% answered that these digital data can be released to the public. This demonstrates that researchers (including archaeologists) are willing to share their digital data.

There is also legislation (Act 26899: Creation of Digital Access Repositories Open Access, Own or Shared) that is changing the rules in requiring free access to digital information obtained from the research process by archaeologists who receive state funding. Undoubtedly, digital archaeology will take a leap in quantitative and qualitative development in terms of digital information available and in the number of institutional or thematic repositories that are created in the not too distant future.

In summary, it can be observed that there has been progress in applying digital products in the research process and work is being done to make digital information



available to researchers and the general public through web applications. Although this process is still under development it must be recognized that Digital Archaeology is here to stay and in Argentina it will become a process that improves interaction between archaeologists and non-archaeologists, advancing multi-vocality in archaeological interpretations.

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