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## Debate Article

### Digital Archaeology and “D” Transforms?

Sarah Whitcher Kansa and Eric Kansa

What is the role of archaeology in the study of digital objects?

In *The coming tsunami of digital artefacts* John Aycock (2021) presents a sort of “call to arms” for archaeologists to study digital objects. This is presumably because we are skilled at studying objects, but to what end? Archaeologists use physical evidence to study individual and collective human behavior over time; contemporary “digital things” also can be evidence for those kinds of questions. But does archaeology necessarily provide a good foundation for using digital objects as a source of evidence? Stepping back, what sorts of questions can digital objects help us explore?

While we should welcome and support expanding archaeology's intellectual horizons—for example, into outer space (Gorman 2019; Walsh et al. 2021), as well as virtual spaces—we should not assume that “to remain relevant in the modern world” (Aycock 2021: pp) we need to focus on the study of digital things. Maybe archaeology's traditional focus on “the study of the old” is still a productive way to contribute to the study of the new and digital. Perhaps there may be fascinating and deep underlying factors that influenced how past people chose to organize the layout of their settlements and how modern people choose to organize websites.

It is possible that one could productively map common archaeological concerns regarding physical phenomena (e.g. sites, strata, artifacts, ecofacts) in order to consider digital things. Archaeology's focus on material culture may, for example, have relevance to digital analogs. What is the *chaîne opératoire* of building, distributing, using, and discarding a digital app? What are the “site formation” processes in a social networking hub? What is the “taphonomy” of a video file that is flagged for copyright violations?

Yet direct analogies can only take us so far. Although digital environments have very real physical substrates, such as hardware, power systems, supply chains, institutions, people and a whole host of environmental, social and cultural effects that can sometimes leave enormous physical traces, digital environments have their very distinct dynamics to which conventional archaeological

method and theory would have very little direct applicability. Archaeology and archaeologists may, of course, be able to contribute to the study of historical changes in digital realms, but so would many other disciplines. Why would archaeology be a better disciplinary framework than a different branch of the humanities and social sciences, such as art history, historical linguistics or literary studies)? After all, many disciplines concern themselves with historical change in abstract realms of thought, language, and literature. So rather than having archaeologists conduct “excavations” on the complex and layered code updates made over the course of a large open-source software project, maybe archaeology would more usefully contribute insights and cautions from its long history of struggle with difficult questions of structure, agency, patterns, and contingency in the study of past human behavior.

Archaeology also concerns itself with the social, political, and ethical questions around the preservation of tangible and intangible cultural heritage. A pressing concern for both contemporary digital objects and digital representations of ancient objects is their potential for responsible stewardship, curation, and reuse. In his discussion, Aycock (2021: pp) asks:

*Will archaeologists in 100 or 200 years lament that the field of today not only failed to engage with these ephemeral artefacts, but that no groundwork was laid to train new generations of archaeologists in how to deal with them?*

He discusses the quickly expanding number of digital resources and expresses concern that we do not have the capabilities to understand them over the long term. Making things “future proof” with regard to contemporary digital artifacts poses the same challenges as working with digital documentation of ancient things. Focusing on the creation of digital objects rather than their maintenance and use risks the filling of archives with unused (and maybe unusable) content. Greater attention needs to be directed to making digital content more accessible and intelligible so that it can be reused, and broadening data literacy so that people know how to use such resources. By expanding accessibility, intelligibility, and skills for reuse, digital content will stand a much better chance of being maintained.

Reuse, however, is not the only problem. Aycock (2021) highlights that the gathering pace at which digital artifacts are entering the Internet Archive generally also applies—albeit at a smaller scale—in archaeology, where digital artifacts (often documenting physical artifacts) are being archived at increasing speed, but are not being reused. An emphasis on *archiving* data rather than on other key aspects of data sharing, such as documentation and description, means that messy and often unintelligible data are entering archives. Data that are difficult to understand are less likely to be reused and this problem will persist unless we change the way we engage with digital information. We need archaeologists with the necessary skills and expertise to converse and collaborate with computer scientists. We also need to understand what types of questions we can ask of “digital artifacts” created in our own discipline in order to better prepare us to explore the digital artifacts created at such huge scales by wider society.

The Secret Life of Data (SLO-Data) project—a collaboration between the Alexandria Archive Institute/Open Context and OCLC Research, and funded by the National Endowment for the Humanities—has documented how under-utilization of archaeological data, even in ongoing field research programs, complicates future data curation and reuse (Faniel et al. 2018; 2021). Encouraging more (and more timely) use of archaeological data can help archaeologists identify “bugs” in their data-creation and modeling practices, improving data quality and prospects for future reuse (see also Kansa et al. 2014).

Improving “data literacy” in archaeology would better equip our discipline to play the role envisioned by Aycock (2021). A 2015 white paper by Rahul Bhargava and colleagues for the *Beyond Data Literacy Workshop* (Data-Pop Alliance 2015:8) describes data literacy as “not primarily about enabling individuals to master a particular skill or to become proficient in a certain technology platform. Rather it is about equipping individuals to understand the underlying principles and challenges of data”. This description is useful because it does not promote a specific technique, service, or technology but instead promotes deeper appreciation of foundational issues of empowerment, critical thinking, and argumentation. This emphasis on argumentation and critique helps to situate data as a central concern for scholarship, rather than on technical proficiency with a specific software application.

Archaeology can and should be more than a consumer of the outcomes of computer science. It can contribute to exploring the roles that digital technologies and media have played in reshaping the world. By necessity, we are already on this path. In attempting to understand the factors that shape archaeological evidence, Schiffer (1975) focused on “site formation processes”, which he broadly categorized these as “N” transforms (various natural phenomena, such as sedimentation and erosion) and “C” transforms (representing the “disturbances” caused by human behavior) that shape the observability of archaeological patterns. As highlighted by the SLO-Data project, this framework should also now include “D” (digital) transforms. What are the factors, such as hard-drive crashes, messy Excel spreadsheets, drop-down menu options, misread tag labels, rejected grant proposals, and so on, that help shape the digital data that represent the archaeological record? So far, many of us working in “digital archeology”, especially those of us concerned with issues in creation, dissemination, preservation, and the reuse of data (data documenting the human past), have largely focused on these “D” transforms in archaeology. By necessity, we are learning much more about the historical trajectories of digital objects and supporting infrastructure, even though, thus far, we have been mainly concerned (and overwhelmed!) by the flood of data that archaeologists themselves create and use. The emerging study of how digital technologies and social realities interplay in the “D” transforms that shape digital archaeological data represents another starting point for expanding the scope of archaeology as advocated by Aycock.

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