No Cradle of Filth – Zero Data Waste through the 5Rs in Austrian Digital Archaeology?

Round Table

This thought-provoking roundtable will discuss approaches, concepts, and principles initially focused on environmental sustainability and waste management - such as the 5Rs ("refuse, reduce, reuse, recycle, rot") - in Austrian digital archaeology and long-term archiving. Such principles can be applied in various ways to minimize the impact of unnecessary digital data waste while reducing the risk of data loss. Measures inspired by the 5Rs may include "refusing" to store redundant data or "recycling" existing data on features and artifacts rather than constantly creating entirely new field archaeological data for research and education purposes. Furthermore (and much more provocatively), redundant, unused, erroneous, incomplete, or other "data waste" must also be considered. Under exceptional (?) circumstances, such useless data (e.g., intermediate results produced on an experimental basis), sometimes formalized as "digital muda" in economic business process management, may be allowed to "rot" (i.e., be deleted), at least for the sake of creating new digital storage space. In light of such considerations, the roundtable aims to address (but is not limited to) the following key questions: Can applying such posthumanist principles to digital archaeology contribute to sustainable long-term archiving in theory and practice? Can the 5Rs be used to minimize digital waste in long-term preservation? What is the role of long-term archived lean research data as a cultural heritage resource for future generations? Based on such guiding questions, interested participants will discuss the topic in a lively exchange of practical and theoretical case studies, thus contributing to the further development of digital archaeological methodology in sustainable data management.

Motivation

Since the beginning of 2023, the Go!digital 3.0 project "IUENNA - openIng the soUthErn jauNtal as a micro-regioN for future Archaeology" has set itself the goal to provide a model study for a sustainable long-term archive of an elaborated excavation at one of the most critical Late Antique sites of the Southeast Alpine region – the Late Antique' pilgrimage center 'of the Hemmaberg and related sites (Globasnitz/Iuenna, Jaunstein, and St. Stefan). Hence, digital archaeology and long-term archiving of digital data are central points of the project (https://iuenna.hypotheses.org). The upcoming CHNT meeting offers the ideal opportunity in the requested round table format to discuss the critical aspects of long-term data preservation in the context of the conference's aims in an international setting:

Working with digital data in archaeology is literally a core domain of digital archaeology. Also called computational archaeology or archaeoinformatics, digital archaeology is the application of digital technologies to archaeological research in theory and practice. It uses computer software, hardware, and data-driven methods to process, analyze, and visualize archaeological data. By doing so, digital archaeology encompasses various techniques and technologies interdisciplinarily. This includes geographic information systems (GIS), remote sensing, 3D scanning and printing, geophysics,

geodesy and photogrammetry, artificial intelligence, virtual reality, etc. These tools and methods enable archaeologists to collect and analyze large amounts of data, visualize archaeological sites and artifacts in new ways to gain new insights, and reconstruct past events and scenarios. It, therefore, empowers archaeologists to understand better the relationships between different archaeological sites and the broader cultural and historical context in which they existed. However, digital archaeology does not replace traditional archaeological methods such as excavation, artifact analysis, and applied fieldwork using spades, shovels, and trowels. Instead, it is a complementary approach that can enhance and support traditional archaeological research and practice as a meta-discipline. Digital archaeology, as archaeology itself, is consequently a complementary medium for the record, dissemination, and preservation of humanity's knowledge of archaeological sites through analyzing complex datasets, reconstructing past landscapes and environments, and creating immersive educational experiences.

However, to ensure that the digital data generated is not just a short-term, fleeting flash of inspiration, it is essential in digital archaeology to strive for sustainable, long-term data archiving: Archaeological data can take many forms, including field notes, photographs, maps, digital images, 3D models, and scientific data. Best practices have been repeatedly established to ensure the long-term preservation of archaeological data: These include setting data management plans, choosing appropriate file formats, and regular data backups stored in multiple locations to provide redundancy in secure storage locations. As pointed out in various corresponding studies, long-term data archiving is critical to archaeological research - it ensures that important information and knowledge about the past can be securely stored, distributed, accessed, and used by future researchers and scholars.

But how are such "best practices" achieved? What epistemological impulses drive archaeologists to conduct "sustainable" archaeological data curation? To make the underlying motives more scientifically experienceable and also to document them in the sense of a "paradata recording" (Sköld et al., 2022), the proposed round table would like to discuss a set of principles commonly promoted to minimize waste and reduce environmental impact: the 5R's – refuse, reduce, reuse, recycle, rot (Balwan et al., 2022). While these principles are primarily associated with current environmentalism, they can also be applied in archaeology to minimize the drawbacks of archaeological research data management. However, the direct transposition of such concepts to archaeology can cause some interpretative difficulties and sometimes does not seem fully coherent:

Refuse: Not to be associated with the cultural formation process, according to Schiffer (1996), in archaeology, "refusing" might also mean avoiding excavation or other forms of research that could damage or destroy an archaeological site. This could involve using non-invasive techniques like remote sensing or surface surveys to study the site without physically disturbing it. Regarding data archiving, "refusing" might apply to not imprudently including all possible data sets in a repository.

Reduce: When excavation is necessary, archaeologists can use the principle of "reduction" to minimize the amount of material that needs to be excavated. This might involve carefully selecting excavation areas based on the research questions or using stratigraphic analysis to focus on specific site layers. Regarding digital data, "reducing" can denote both not generating an unnecessarily disproportionate amount of data and not archiving an equally unreasonable amount of data.

Reuse: Again, not to be confused with Schiffer's cultural formation process, in archaeology, "reuse" might mean using existing data and artifacts to answer research questions rather than excavating new material.

Recycle: In archaeology, "recycling" might involve repurposing research data and materials from field studies for other forms of research or teaching; here, this concept may be closely related to "reusing." As mentioned above, this principle may not be confused with Schiffer's cultural formation process. Instead of being stored in the depot, artifacts too damaged or incomplete to be displayed in a museum can be used for educational purposes or scientific analysis - such artifacts are even "upcycled" since they are put to a higher-value use. The same applies to digital data, e.g., for large-scale statistical analysis or student training.

Rot: This concept is seemingly the most challenging, as it is in extreme contrast to preserving archaeological finds and features. Nevertheless, in archaeology, "rot" may refer to critically considering redundant, unused, incorrect, incomplete, or other "data waste" (Bietti & Vatanparast, 2020): Such useless data (e.g., interim results prepared on a test basis), sometimes formalized as "digital muda" in economic process optimization management (Alieva & Haartman, 2020), are not meant to be further used and may, under exceptional (?) circumstances, be left to "rot" and "composted," i.e., deleted, at least for the sake of creating renewed digital storage space.

By being mindful of the digital waste produced by their work and actively seeking ways to reduce it, archaeologists can help to provide "lean archaeological data," which may therefore be sustainably archived more efficiently for future generations (Alieva & Powell, 2022; Romero et al., 2018, 2019). Overall, ecology- and economy-inspired principles like the 5Rs and lean management may help archaeologists minimize the opposing sides of managing archaeological research data. Based on this core idea, interested participants will discuss this hypothesis in a lively exchange of practical case studies and theoretical contributions in the round table, thus contributing to the further development of digital archaeological methodology in sustainable data management.

Target Audience

The target audience is expected to be archaeologists and other digital humanities scholars who work with digital data and are more deeply involved in the long-term archiving of computer-based data from (scientific and cultural-historical) archaeological branches and beyond. This includes researchers whose activities (admittedly often with different emphases) range from data collection in field archaeology and laboratory work to data analysis in the archive and long-term storage and distribution of archaeological data.

Keywords

#digital archaeology #long-term data archiving #Austria #5Rs #digital waste