Paola Derudas

Documenting, Interpreting, Publishing, and Reusing: Linking Archaeological Reports and Excavation Archives in the Virtual Space

Doctoral dissertation in Archaeology
Department of Archaeology and Ancient History, Lund University
Acta Archaeologica Lundensia Series altera in 8°. Vol 74
Lund University, 2023
129 pp.
ISBN (print): 978-91-89415-63-8
ISBN (electronic): 978-91-89415-64-5

Review by Daniel Löwenborg

The use of 3D models to document excavations has become increasingly common in archaeological practice. Because of their possibilities, 3D techniques have enthusiastically been included in the toolbox of the modern, digital archaeologist, as a fascinating way to quickly produce high-quality representations of archaeological trenches, features and finds. In contrast to a traditional plan drawing on paper or even 2D GIS, a 3D model can show a phase of an excavation in great detail and allows the user to interact with the model by zooming and rotating. This makes it possible for anyone to explore the different parts of a trench in detail, almost as though seeing it during the excavation, opening up possibilities for reuse and re-evaluation

Department of Archaeology and Ancient History, Uppsala University, Sweden
daniel.lowenborg@arkeologi.uu.se

of the documentation. Following technical advancement, it is now fairly straightforward to create high-quality 3D models as part of fieldwork, something which has contributed to their wide application in both research and contract archaeology. However, there are considerable challenges when it comes to integrating these models in a proper documentation of an excavation and making the data useful and relevant, especially if not intended only as an illustration. How 3D GIS technology can be used as a scientific tool in archaeological excavations and reporting is the topic of Paola Derudas' doctoral thesis. Through different case studies and a number of iterations of technical platforms, she develops and tests how 3D models can be more than engaging illustrations and contribute to different aspects of the archaeological practice.

The thesis consists of five research papers, three that have been published in international peer-reviewed journals, one that was submitted when the book was published, and one available as a manuscript. Derudas is the first author of all papers and the sole author of one. The research centres on exploring how documentation using 3D techniques can be used for interpreting, publishing and reusing archaeological results. Extra focus is placed on how these methods for documentation can be used to 'refine new practices rooted in reflexivity and multivocality' (p. 11). The research is closely linked to practical implementation of the systems during fieldwork as part of education and research excavations in Sweden, where the usefulness of the systems is evaluated together with the archaeologists. As part of the project, a number of technical platforms are designed and tested. Each system solves some problems and highlights needs for further development. It starts with the *Interactive Visualization System* (IVS), an online system that makes it possible to make the documentation available for collaboration with off-site specialists. The next one is the *Interactive Reporting System* (IRS), 'a dedicated set of tools for using the system as a primary means for editing a dynamic archaeological report' (p. 25). The final system is the *Archaeological Interactive Report* (AIR). This is 'a web platform designed to incorporate and archive the full set of archaeological records (including data from advanced 3D recording technology) and edit multiple narratives linked with the excavation archive' (p. 21).

The three frameworks are tested through four 'experiments' as part of excavations. The first two are field courses in archaeology at Kämpinge, a Mesolithic site in Skåne, and Södra Sallerup a Bronze Age and Iron site Age just east of Malmö. Testing the system as part of field courses allows thorough evaluation of the usefulness of the methods in engaging with the archaeological material and documentation in an educational context, and to test the potential of the systems for interpretation and deep learning. The third experiment is part of a research excavation at Västra Vång, an

Iron Age central place in Blekinge. Here the system is tested with experienced professional archaeologists for documentation, management of data and publication. This is also when the AIR system starts to be developed, and it comes into full use at the maritime excavations of the Gribshunden ship, where the system is put to the test in the challenging environment of underwater archaeology.

The different experiments that are presented in the research papers highlight challenges and possibilities with using 3D technology in archaeology. This relates both to technical solutions and existing platforms, but the focus is always on the extent to which the technology helps the archaeologists to document during the excavation and to interpret and reflect on the results as part of writing the report. A review and evaluation of different online archaeological publication systems is presented in paper three. It should be noted that none of the experiments involve contract archaeology with the specific financial and regulative conditions for this. The focus is on developing methods and designing technical frameworks, without clearly pinpointing a specific target audience as the future users of the system. However, the technical solutions that are developed are open-source and could be adopted by anyone with sufficient technical competence.

AIR builds on the Content Management System Omeka S. It was designed and developed in collaboration with the French National Institute of Art History, building on the experience they have of working with data management for cultural heritage information. AIR enables the combination of web-based 3D visualization together with data organized using techniques that are oriented towards the semantic web. This will make it possible to do more advanced and complex queries in the future, when there are semantic definitions of the information and systems available that can understand how contexts, finds and the results of scientific analysis relate to each other so that this can be explored using modern search engines.

At this stage, it is primarily the situation of the single excavation that is addressed. Derudas presents in-depth discussion about the interpretive process as part of the excavation, the possibilities of writing the report, and the interactive exploration of the site afterward through the online systems that integrate the 3D content with the other parts of the documentation and interpretations. The rich documentation and the powerful visualisation techniques allows multivocality in the interpretations and encourages different perspectives, both with the participants during the excavation but also in reusing the documentation and the reporting system afterwards. With the detailed documentation comes unique possibilities of revisiting an excavation in 3D, enabling other perspectives to be explored and new interpretations (as previously shown for example by Dell'Unto & Landeschi 2022:78–82).

The possibilities of combining and aggregating results from different excavations and the promise of Big Data approaches is mentioned but is mostly something for future development. Currently there is much investment in research infrastructures that are seen as essential for making archaeologists able to undertake large-scale data analysis and contribute to research questions such as long-term social dynamics and climate change through the synthesis of archaeological information (Huggett 2023:16). Here, the end goal is primarily the single report, albeit in this form it is an interactive online report that allows anyone to engage and explore the digital content to great length. The benefits of making the data itself available and reusable is discussed in the introductory chapter, where the system is evaluated for FAIRness and the possibilities of working with semantic mapping solutions such as CIDOC-CRM and RDF in the future.

The project takes major steps to further advance archaeological methodology. How archaeologists document and interact with material in the field and during the post excavation phase is important as archaeological sites are replaced by their documentation when the area is needed for modern development. This project builds on extensive expertise in the use of 3D GIS, developed over many years at the DARKlab at Lund University, establishing it as a world-leading environment for 3D GIS in archaeology. Derudas improves this further through pairing 3D visualisation techniques with semantic web solutions. It may not be realistic to expect AIR to be widely adopted in contract archaeology in the near future, due to the complexity of the technically advanced system and the organizational situation within contract archaeology. However, the final paper of the thesis, about Gribshunden, is a very powerful and convincing demonstration of the strengths of the AIR system. It shows how the technical system can support documentation strategies in a complex excavation situation, allowing both a reflexive approach and powerful 3D visualizations to aid research and interpretations. Here lies the main strength of the AIR system: it can be developed into an essential tool for managing the very challenging kinds of excavation situations that marine archaeology presents. Another strength lies in making more of the original documentation accessible to everyone, including the public, for whom the interactive elements may be more engaging than traditional reports or data. The most important potential, as I see it, is for extensive research excavation projects conducted over many years, where documentation can be combined with later excavations and revisited to continually expand knowledge and interpretation of a site. While most archaeological excavations may not undergo extensive reinterpretation, some sites are returned to repeatedly over decades. With the possibility of reinterpretation and multivocality that AIR provides, the documentation from these kinds of excavations can be used and reused much more

efficiently. As such, AIR has the potential to transform the archaeological practice of excavating and documenting (complex) archaeological sites.

References

Dell'Unto, N. & Landeschi, G. 2022. *Archaeological 3D GIS*. London: Routledge, doi:10.4324/9781003034131.

Huggett, J. 2023. Deconstructing the Digital Infrastructures Supporting Archaeological Knowledge. *Current Swedish Archaeology*. Vol. 31, pp. 11–38, doi:10.37718/CSA.2023.01.