Reframing Digital Archaeological Infrastructures

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In his extremely thorough keynote, Jeremy Huggett discusses the development of digital infrastructures in archaeology over the past 30 years and highlights the need for a broader understanding of their impact. These infrastructures, ranging from data collection systems to national archives, have become central to archaeological practice, but their political, cultural and social dimensions are often overlooked. The keynote emphasizes the importance of critical reflection to avoid unforeseen consequences, biases, and the promotion of specific conventions. It calls for a more comprehensive debate on their implementation, opportunities, constraints and perspectives.

Central to the keynote is the exploration of the concept of 'infrastructures', which Huggett describes as complex sociotechnical systems. The definition and usage of infrastructures in archaeology vary, but they are seen as essential for the discipline's development, enabling new methods and knowledge creation while also limiting certain practices. Huggett argues for a shift in focus from specific tools and components to a more holistic analysis of digital archaeological infrastructures, treating them as emergent rather than static phenomena. He therefore underscores the requirement to consider infrastructures as ongoing processes, subject to change and adaptation over time, and highlights their situated nature within cultural,

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social, political, technological and spatial contexts. The values embodied in infrastructures can introduce biases and conflicts, affecting how data is presented and used. Huggett explores the impact of standardization, metadata and user interfaces on knowledge creation within infrastructures, emphasizing the need for critical examination of these components. They are, after all, crucial strategic and political decisions in themselves.

Several interesting points of discussion emerge from Huggett's thought-provoking arguments. His attempt to unpack the notion of infrastructures and examine which categories archaeological infrastructures fall under raises several issues. Firstly, Huggett does not seem to be concerned with comparing and contrasting European archaeological research infrastructures such as ARIADNE and national archaeological infrastructures such as the ADS, ADAP, or tDAR. It seems important to address the differences between those initiatives, as they vary in scope, geographic coverage, governance and sustainability strategies. Secondly, Huggett's analysis does not fully consider the impact of the new 'thinking infrastructures'. He analyses the evolving and sometimes inconsistent use of the term 'infrastructure' in various academic and research contexts, including archaeology, and describes how the concept has developed over time, encompassing information infrastructures, knowledge infrastructures, and more recently, thinking infrastructures – each with its own characteristics and focus. Following this, archaeological infrastructures are categorized as information infrastructures (as they primarily aim to provide tools, repositories and standards for managing and accessing archaeological data and resources), and as knowledge infrastructures (as they involve a network of institutions, people and information resources that facilitate the transformation of observations and contemplation into standardized archaeological knowledge objects). Huggett stresses that thinking infrastructures are more collaborative, distributed and decentralized. He underlines how they blur the boundaries between knowledge producers and consumers and aim to eliminate intermediaries. However, while the keynote does not explicitly account for thinking infrastructures in archaeology, the development of new technologies and approaches like big data and deep learning could potentially impact the way research infrastructures operate in archaeology. For example, if archaeological infrastructures increasingly incorporate AI and machine-learning methods, they will align even more closely with the principles of thinking infrastructures in terms of decentralization and collaboration. This, again, is a point which would benefit from the distinction between national and European initiatives, and would allow for more fluidity in the categorization of archaeological infrastructures in this evolving landscape. This would, most likely, span across even more categories, not least because their positioning will surely change over time as their roles and functionali-

ties evolve to meet the changing needs of the archaeological research community and as new technologies and paradigms emerge.

In his keynote, Huggett also emphasizes that infrastructures are not guaranteed to succeed or endure long-term due to challenges related to resources, technological changes and competition from other infrastructures. He rightly argues that assuming infrastructures are stable and immune to change can lead to their failure. It is long-established that it is the dynamic, agile infrastructures that manage to sustain themselves. The example of the Archaeology Data Service (ADS) is cited, which faced potential closure due to funding issues but managed to adapt and survive by demonstrating its value and securing transitional funding. This is indeed the experience of APOLLONIS, the Greek Infrastructure for Digital Arts, Humanities and Language Research and Innovation, which managed to secure transitional funding from the Hellenic Foundation of Research and Innovation in order to maintain its ties (i.e. financial contribution) to DARIAH-EU and CLARIN-EU while supporting and expanding its user base. What is also key to the long-term endurance of infrastructures, and which Huggett addresses mostly in passing, is the users. While social and cultural aspects of infrastructures are noted, with emphasis on networks of relationships among individuals and communities, the role and categorization of the different social groups that play a part in the development and maintenance of infrastructures – including researchers, support groups, and communities of practice – deserves a closer analysis (or 'hands-on users', 'social actors' and 'sociopolitical actors' as Huggett distinguishes them, after Millerand and Baker 2010). Users are the cornerstone of infrastructure, and it is of course no easy task identifying and classifying them. However, deep understanding of a user base and identification of their needs and methods on a granular level may guarantee financial, technical and social sustainability.

Scholarly discourse in the field of digital infrastructures has unfolded across several decades, offering a panoramic view of the field. Among these references, Huggett's work stands out as a comprehensive repository of ideas, albeit with some caveats. While Huggett diligently gathers insights from an extensive array of sources, a few of these references appear dated and some have encountered skepticism from both scholars and infrastructure practitioners. For instance, the 2007 perspective presented by Edwards et al., suggesting that infrastructures are primarily defined by data, seems increasingly disconnected from the dynamic realities of infrastructural development on national and international scales over the past decade. Among the references in question are those from Gaines (1981a, 1981b), which delve into databank management in archaeology. These older texts are becoming antiquated in the swiftly advancing landscape of digi-

tal archaeology. The same goes for Star (1999), which explores the concept of a 'master narrative'. While potentially pertinent in certain contexts, it cannot bear the weight of over two decades of transformation in the field. This raises the need for a more critical examination of such ideas. Nonetheless, Huggett's reference list weaves a narrative of the changing tides in digital infrastructures supporting archaeological knowledge. It stretches from the early 1980s to the current year 2023, mapping the progression of ideas, methodologies and technologies. From Eiteljorg II's contributions in the 1990s and early 2000s, to the insights of Kenny and Richards (2005), Kintigh (2006) and the more recent works of Paris, Baiyere and others in the 2020s, the compilation signifies an evolving and dynamic discipline. Each reference encapsulates the spirit of its era and collectively underlines the ever-shifting nature of digital archaeology practices, emphasizing the necessity of reevaluating older concepts in the context of modern realities.

Overall, in his illuminating keynote address, Huggett has brought to the forefront a critical perspective on the development and impact of digital infrastructures in archaeology. By shedding light on the often-neglected political, cultural and social dimensions of these infrastructures, he underscores the need for thoughtful reflection to anticipate unintended consequences and biases. Huggett's call for a broader and more nuanced examination of infrastructures challenges the archaeological community to move beyond specific tools and components to comprehend these complex sociotechnical systems holistically. His insights provide a valuable framework for understanding their dynamic role in shaping archaeological knowledge. While his exploration of categories and their potential evolution raises intriguing questions, it also highlights the need for a more nuanced approach that accommodates the fluidity of this evolving landscape. In particular, the intricate network of relationships they entail warrant further exploration to ensure both technical and social sustainability. Ultimately, Huggett's keynote paves the way for informed and responsible future developments in the field.

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