

CONCLUDING REMARKS: LOOKING BACK AND MOVING FORWARD TO THE OPENNESS AND INTERACTION OF KNOWLEDGE

The symposium *Linking Pasts and Sharing Knowledge*, held in Naples and meticulously orchestrated by Rodolfo Brancato, Julian Bogdani, and Valeria Vitale from the Universities of Naples Federico II, Rome La Sapienza and Sheffield, respectively, concluded after two enriching days of significant exchange among experts and public engagement.

The event opened with two workshops focused on ‘The Open Source Platform Recogito (Pelagios Commons): From Semantic Annotation to Linked Open Data Creation’, and ‘Re-Shaping Lidar Data for Landscape Archaeology Research’. These preliminary sessions laid the groundwork for a successful symposium characterised by cutting-edge discussions and collaborative ventures into the frontier fields of digital archaeology. Indeed, the selected themes perfectly exemplify the interdisciplinary nature of digital archaeology, blending the logical frameworks that guide data representation with technological advancements in the acquisition and processing of archaeological data.

During the conference, scholarly presentations were collected into two panels: ‘Digital Approaches in Archaeological Mapping’ and ‘Digital Integration of Archaeological Legacy Data’. The choice of the symposium’s title and the themes of the two sessions reflect the innovative methodologies currently employed within the domain of digital archaeology and highlight the critical importance of integrating and revitalising the understanding of archaeological spaces and sites.

Digital mapping is a pivotal aspect of archaeological computing. Its origins date back to the 1970s, gaining momentum as early as the late 1980s, alongside the advent and proliferation of GPS technologies, which transformed the modus operandi for mapping and recording archaeological evidence of the past. Furthermore, this evolution laid the foundations for both the development of Geographical Information Systems and the renaissance of Spatial Archaeology studies. As Paolo Sommella noted in 1990, the longstanding tension between archaeology and urban planning has been mitigated by the advent of computer-based approaches that can reproduce archaeological datasets at scales optimally suited for various user requirements. Once analysed and recorded by specialists, these data are made accessible in formats tailored to a wide array of scholarly and operational requirements (SOMMELLA, AZZENA, TASCIO 1990).

In the age of the Internet, cartography has played a central role in interactive communication paradigms, especially concerning mobility and

territorial monitoring. It has determined a renewal of geographical sciences under the auspices of multimedia integration and, over time, has adopted different and various descriptors related to its specific purposes and the virtual working environment, as well exemplified by the emergence of terms such as webcartography and cybercartography. However, in light of the many contributions discussed in the first session, these terms today may oversimplify the advancements achieved through the evolution of cartographic practices. Interactive maps have emerged as the primary medium for data access and consultation, as demonstrated by several projects presented during the symposium, which explore archaeological contexts in a wide geographical area with evidence spanning from prehistoric to modern times.

In 2012, in the entry 'Digital Terrain Models' for the 21st Century Lexicon of the Treccani Encyclopaedia, I noted that digital mapping enables the creation of highly accurate three-dimensional representations of terrain surfaces that mimic the physical world, making them applicable in various contexts. Digital Terrain Models (DTMs) are instrumental in the analysis of terrestrial morphology, spatial distribution patterns, and mobility dynamics across landscapes. Furthermore, DTMs are crucial for the development of visualisation technologies and interactive web-based navigation platforms, such as Google Earth, where three-dimensional datasets are combined with other types of information typical of multimedia applications.

From these premises arises the topic of landscape visualisation and modelling, a subject appropriately addressed at the onset of the meeting by Margherita Azzari and Paolo Liverani. Several innovative aspects distinguish this specific domain. Notably, the application of Artificial Intelligence techniques, with a particular emphasis on Machine Learning, consolidates both the interpretation and analysis of Remote Sensing data in environments that present considerable challenges in terms of accessibility and legibility, as well as the development of predictive models. Concurrently, the simulation of ancient social dynamics benefits from Agent-Based Modelling techniques, which are employed within virtual environments designed to mirror the intrinsic properties of the natural landscape, thereby contributing to the understanding of previously unexplored and new aspects.

From a data structuring perspective, just as digital cartography underpins the projects illustrated in the symposium, GIS platforms continue to serve as the cohesive environment for data processing. The GIS-based approach in archaeology is not a recent phenomenon – it can be traced back to the 1990s – but the proliferation of free and open source software significantly fuels its ongoing evolution today.

The first session of papers and discussion introduces some interesting terminological insights, particularly in the realm of neologisms that often reflect emerging technical-scientific advancements and innovative cultural

trajectories. Among the terms discussed, two are worth noting: datafication and provocation. The first term, datafication, was included in the Lexicon of Neologisms by the Treccani Encyclopaedia in 2019 – despite an isolated precedent in the newspaper *La Repubblica* in 1986 – with a definition that highlights its meaning as a technological process that transforms various aspects of social or individual life into data, which are subsequently transformed into information with new forms of value, including the economic one. In digital archaeology, datafication acquires a distinct interpretation: as elucidated by Jeremy Huggett, the term emphasises the quantification and automatic generation of data, in contrast to dataism, i.e. confidence in data accuracy, completeness, and reliability, and data centrism, i.e. trust in data and its unbiased results (HUGGETT 2020).

On the other hand, the term provocation is relatively more familiar. Nonetheless, it has been endowed with a specific meaning in the context of the ROMETRANS project. Here, visualisations are designated as ‘provocations’ because, despite being grounded in rigorous research, they are not considered conclusive outcomes but rather as visual cues intended to facilitate an ongoing dialogue within the scientific community. The digital integration of archaeological legacy data was the focal point of the second session of the symposium. Integration underlies all the processes of digital archaeology, and more generally, digital Humanities, since their inception. This was exemplified by the seminar organised by Tito Orlandi in 1991 at the Accademia Nazionale dei Lincei, titled *Informatica e discipline umanistiche. Il problema dell'integrazione*, which questioned how many forms of integration exist in a virtual research environment (ORLANDI 1990). In the 1990s, integration was addressed to find common ground between information sciences and the Humanities to outline a common interdisciplinary approach.

Today, the term integration is predominantly associated with technological competencies, encompassing the merger of digital devices and software applications. Furthermore, it extends to the digital transformation of the organisational workflow relevant to the archaeological research process, from initiation to completion. The papers presented can be analysed as a whole, starting with the central focus on legacy data that has gained popularity today. The use of this term in the field of digital archaeology can be traced back to the thematic issue published in the journal «Internet Archaeology» in 2008, titled *Dealing with legacy data*. As argued by Penelope Allison, this term refers to pre-existing data not in digital format to be retrieved, formalised, and processed within GIS systems or, more generally, in digital environments (ALLISON 2008; on the imperative of publishing primary data, see also ATICI *et al.* 2013). Even earlier, Keith Kintigh also addressed the subject of legacy data in connection with data integration in the journal «American Antiquity», with an essay titled *The promise and challenge of archaeological data integration*.

In this work, the Author maintains that only data integration permits the use of existing data to answer compelling new questions, through an approach based on the analyses of «meaningfully integrated new and legacy data sets» (KINTIGH 2006).

During the symposium, several areas emerged where the topic of legacy data proved to be particularly significant, such as in epigraphic studies, which were the subject of several papers on the second day. Digital epigraphy studies interface with historical-topographical research in various ways and perspectives. From a technological point of view, the most interesting outcomes stem from the application of Machine Learning techniques in the study of ancient texts. Computational algorithms support various phases of research, including digitisation, restoration, linguistic analysis, textual criticism, and translation. Meanwhile, the historical and cultural contextualisation of information acts as a methodological prerequisite, ensuring that these analyses are grounded in a comprehensive understanding of the texts' origins and significance.

The symposium has a further merit as a discussion forum, particularly for revisiting the theme of cartography from the perspective of 'classical digital geography' (or the history of geographic computing and the classics: ELLIOTT, GILLIES 2009). This digital approach was initially developed to map and georeference large-scale geographical references found in classical texts, interconnecting them within a networked knowledge framework. At present, the utility of geoparsing activities is perceived as somewhat limiting, especially when operating within a GIS environment that permits greater dynamism compared to traditional media. The cataloguing and mapping of the ancient world face the challenges of integration, in terms of enhancing all information related to a place conceived as a multifaceted entity characterised by social and cultural dimensions and subject to perpetual transformation. Furthermore, contemporary e-infrastructures have facilitated the semantic annotation and integration of resources with spatial connotations, promoting the interconnection of disparate archives through the implementation of the Linked Open Data paradigm.

Having looked back to find the roots of current developments in digital archaeology, it is time to focus on its most promising prospects, which arise from two facets of the information society: the openness of data and the interaction of knowledge. In the first case, there is a recognised need to pursue a model of open and collaborative science at both the European and global levels. However, merely acknowledging this need is insufficient if specific attention is not paid to the impact of research results beyond the scientific community and to the notion of 'outcomes'. Indeed, these outcomes inherently possess a relational nature and are subject to changes that can alter the process from which they originate.

In the accelerating process of the open science movement, it is noteworthy to observe the commitment of the Journal «Archeologia e Calcolatori» – host of this symposium’s proceedings – to the Open Archives Initiative over the past two decades (MOSCATI 2021). This commitment has enabled the development of a circular model for knowledge acquisition, exchange, and transfer based on more than thirty years of published data. Here, the ‘provocation’, often referenced during the symposium, stems from the presence of a ‘simple’ open access article at the core of this model, stored in an OAI-PMH repository. Its unique ID connects to incoming and outgoing information flows sourced from institutional databases associated with the journal, which, in turn, feed external repositories and European e-infrastructures, linking geographic locations, cultural contexts, subject classifications, bibliographies, and iconographic data, including 2D images and 3D objects.

Regarding the fostering of knowledge interaction, in addition to the essential interdisciplinary approach that has characterised archaeological research since the 1960s, this interaction – encompassing both interpretation and reconstruction – is now further enhanced by the adoption of increasingly collaborative methodologies. This approach facilitates the transcendence of a hyper-specialised view of science, advocating instead for a holistic perspective of knowledge that is emblematic of the Human Sciences. At the same time, it fosters a thoughtful and informed vision of the application of technologies.

I would like to conclude this effort to comment on comparative themes related to both archaeology and history – a task to which I was kindly invited by the Organising Committee – by revisiting the evocative title and subtitle of this well-focused symposium: *Linking Pasts and Sharing Knowledge. Mapping Archaeological Heritage, Legacy Data Integration and Web Technologies for Modelling Historical Landscape*. This reiteration emphasises the relevance of the themes that permeated these two intense days and contextualises them within the broader context in which digital archaeology currently operates.

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