



Information Research, Special Issue: Proceedings of the 15th ISIC - The Information Behaviour Conference, Aalborg, Denmark, August 26-29, 2024

## Layers upon layers: data sharing & reuse challenges in archaeological contexts

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DOI: <https://doi.org/10.47989/ir292840>

### Abstract

**Introduction.** This short paper presents preliminary findings from a study of archaeologist's information practices relating to data sharing and reuse.

**Method.** Semi-structured remote interviews were carried out with 16 archaeologists relating to their research interests, their data creation, use and reuse practices, as well as the general views on the importance of data sharing and reuse in archaeology.

**Analysis.** Analysis was undertaken using an inductive, thematic approach informed by Kemmis et. al.'s (2014) practice architectures model.

**Results.** The findings demonstrate that participants' data sharing and reuse information practices feature cultural-discursive, material-economic, and social-political arrangements and that these three forms of arrangements are often interrelated.

**Conclusion.** The practice architectures framework can make a significant contribution to both finding solutions to some of the key issues that have hampered the development of the Open Data movement, as well as offering possibilities for new avenues of information practices research.

## Introduction

**This short paper presents** the preliminary findings from a new phase of analysis as part of an existing, ongoing research project which:

*investigates what information about the creation and use of research data (that is, paradata) is needed and how to capture enough of that information to make the data reusable in the future... The empirical focus of [the project] is archaeological and cultural heritage data (CAPTURE project website, 2024)*

The Open Data movement has become an increasingly influential feature of the academic world for more than a decade. Commentators from across a broad spectrum of disciplines in the sciences and social sciences have called for researchers to make their data available to their peers in the interests of academic transparency. Others have called for greater reuse of existing data, both contemporary and historical, arguing that different perspectives and techniques might lead to new findings that the original researchers did not consider. At the same time, a growing number of national and international funding bodies have moved towards making open access to research data a requirement for project approval.

Despite this, the road towards open data access and increasing data reuse has proved less than smooth. Creating data repositories whose content is accessible in heterogeneous disciplines has proved challenging (Mostern and Arkely, 2016). At the same time, existing research indicates that many researchers, particularly in the social sciences, remain reluctant to make their data available to others (Zenk-Möltgen et al., 2018). The present research aims to shed light on these issues by developing a greater understanding of the complex practice architectures (Kemmis et al., 2014) in which archaeological researchers information practices take place.

## Conceptual framework

This paper adopts an information practices approach as its overarching conceptual

framework building on the first author's extensive previous information practices research experience (e.g. Olsson, 2013; Olsson, 2016; Olsson and Lloyd, 2017; Olsson, 2022). An information practices approach allows the present study to shift: '*... the focus away from the behavior, action, motives and skills of monological individuals. Instead the main attention is directed to them as members of various groups and communities that constitute the context of their mundane activities*' (Savolainen, 2007, p. 120)

In addition to information practices approaches within information studies, the study has also been informed a range of theories from outside the discipline, including Sense-Making (Dervin et al., 2003), discourse analysis (Foucault, 1972) and practice theory (Gherardi, 2008; Kemmis et al., Nicolini, 2012, 2014; Schatzki, 2002).

The present study seeks to understand not only participants individual information practices but also how their sayings, doing, and relatings (Schatzki, 2002) are related to the complex socio-technical environment with which they interact. The actors in this environment include not only other people but a range of socio-technical systems that both enable and constrain their ability to pursue their practices as researchers. The study has therefore been informed by the concept of *practice architectures* as developed by Kemmis and his collaborators, including information practices researcher Annemaree Lloyd (Kemmis et al., 2014; Lloyd, 2010; Mahon et al., 2017) as used by the first author in a previous study (Olsson, 2022).

The study uses Kemmis et al.'s (2014) model (Figure 1) as a conceptual lens through which to explore the ways in which participants' information practices do not occur in isolation but are inextricably linked to the practice architectures that make up their information environment/s.

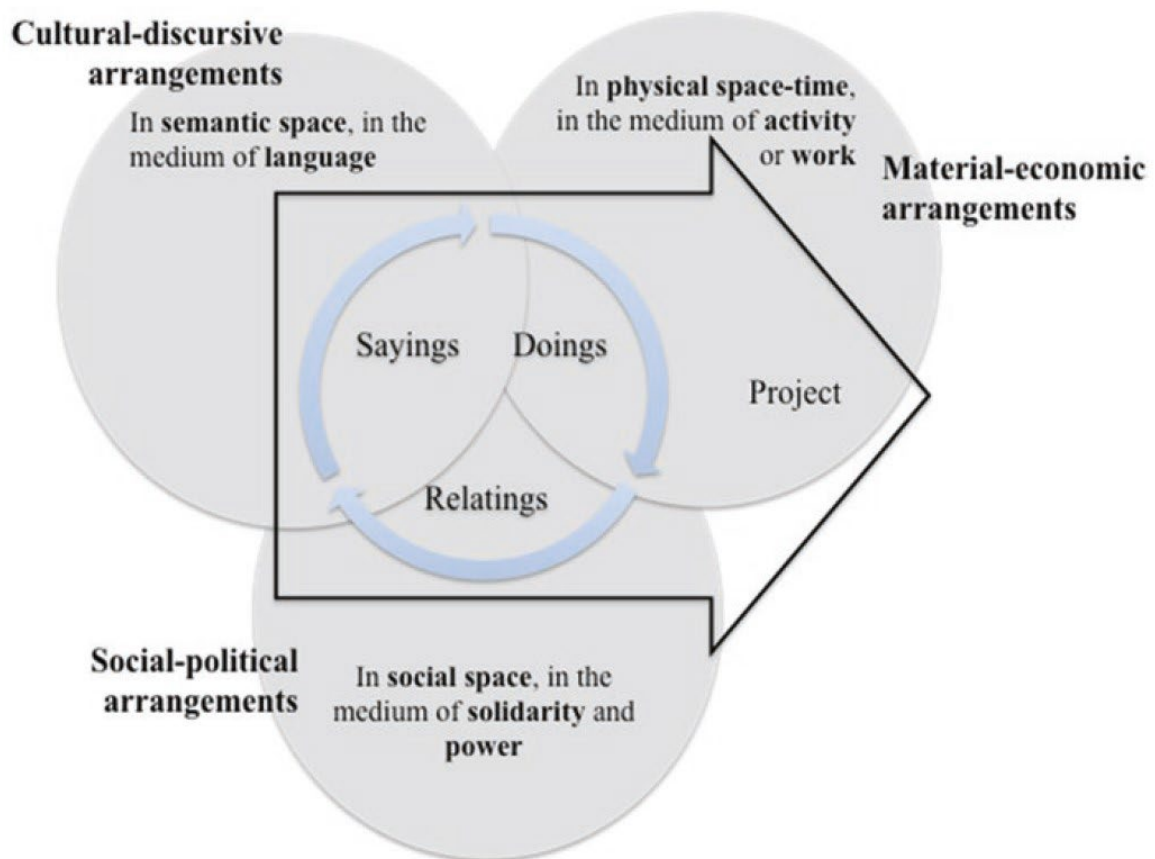


Figure 1. The media and spaces in which sayings, doings, and relatings exist. Kemmis et al. (2014, p. 34)

These architectures are multifaceted and include different types of arrangements: cultural-discursive, material-economic, and social-political. These arrangements should not be seen as discreet domains but are 'bundled together in characteristic ways in practice landscapes' (Mahon et al., 2017, p. 13).

Whilst existing research (e.g. Mostern and Arkely, 2016; Wood and Pinfield, 2022; Zenk-Möltgen et al., 2018 ) has already described the many obstacles and enablers of research data reuse, the present study's aims to explore whether practice architectures can provide information researchers with a more coherent theoretical framework for understanding these factors more holistically: affording the possibility to see them as aspects of the broader socio-technical landscape/s that shape researchers' practices.

## Methodology

This paper is based on re-analysis by Olsson of the transcripts of interviews with 16 archaeologists conducted in English by Sköld and Andersson. The interviews were semi-structured in nature with both researchers using the same interview guide. Due to COVID restrictions, all interviews were carried out remotely via Zoom.

Although the participants were all archaeological researchers, they came from a variety of different countries, experience levels and research interests (see Appendix I). The interviews covered the participants' research interests, their data creation, use and reuse practices, as well as the general views on the importance of data sharing and reuse in archaeology. Participants' identities are

anonymised using pseudonyms chosen by the first author.

Analysis was undertaken using an inductive, thematic approach (Bryman, 2012). The initial analysis was consciously informed by Kemmis et. al.'s (2014) practice architectures model. However, the study's aim was not to test the validity of this theoretical approach, but rather to use it as a thinking tool in developing a contextualised, situated understanding of the participants' information practices. Its use as an analytical tool will be further developed in the project's ongoing research.

The analysis used Kemmis et. al.'s (2014) definitions of cultural-discursive, material-economic, and social-political arrangements (included below at the beginning of the relevant sections of the findings) as the basis for its coding framework. Through this it aimed to identify aspects of participants' accounts that demonstrated instances where their data sharing and reuse practices were shaped such arrangements. Kemmis et al. (2014) make clear that these forms of arrangements are inextricably linked, therefore the analysis did not attempt to code participants' practices atomistically. Consequently, many of the participants' practices demonstrate the influence of two or even all three forms of arrangements.

## Results

This short paper presents some preliminary findings from the study. They have been grouped using the three categories of arrangements defined by Kemmis et al. (2014). The results described here are not exhaustive but intended to illustrate the utility of practice architectures as an analytical tool in information practices research. The initial results described here are intended as a preliminary *proof of concept* that practice architectures can provide a useful conceptual tool as the research project continues.

### Cultural-Discursive

*Cultural-discursive arrangements are the resources ... that prefigure and make possible particular sayings in a practice, for example, languages and discourses used in*

*and about a practice ... They can constrain and/or enable what it is relevant and appropriate to say (and think) in performing, describing, interpreting, or justifying the practice. (Mahon et al., 2017, p. 9)*

The cultural-discursive landscape of archaeology as a discipline is extremely heterogeneous. This can be seen in the wide diversity of research interests reported by the study's participants (see Appendix 1). These cover a huge range of both time periods (from the Pleistocene to the Medieval) and levels of focus ranging from the microscopic, through the details of particular types of archaeological finds, to the geospatial mapping of the prehistoric landscape. Their theoretical and methodological approaches are equally diverse, ranging from quantitative analysis grounded in positivist scientific traditions to constructivist approaches grounded in the social sciences. It is therefore hardly surprising that participants describe considerable difficulty in finding the data they need in the archived work of researchers, especially that coming from different archaeological sub-disciplines.

Participants also described their frustrations with the limitations of the standardised controlled vocabularies employed by the digital repositories they use to find data: *'The terms are often really generic and vague. It makes it hard to work out whether the data is relevant to me or not.'* **Valli**

In doing so, they recognise the near impossibility of traditional, proscriptive taxonomic approaches to meet the needs of a such a diverse community.

Participants also point out that even extremely common terms are used differently in different countries or even with them. For example, while the term *Iron Age* is used in England and Wales for the period up to the Roman invasion in the First Century CE, in Scotland it is used for sites up until the Viking period at the end of the Eighth Century CE.

Technical practices derived from a print-based culture can also be problematic. A number of

participants also talk about problems with the file format in which most archaeological reports are uploaded into digital repositories being a barrier to reusing the data they contain:

*But the format we get the data in is not reusable, so I'm interested in data that's collected in the field, and how that can then be reused. But what I receive, ... is a PDF report. So, plan information and all the sort of GS spatial data is just fossilized into print, so it's very frustrating. Jove*

### Material-Economic

*... resources (e.g., aspects of the physical environment, financial resources and funding arrangements, human and non-human entities, schedules, division of labour arrangements), that make possible, or shape the doings of a practice by affecting what, when, how, and by whom something can be done (Mahon et al., 2017, p. 10)*

The concerns described above can also be seen to be related to material-economic factors. They recognise that the archaeological repositories they depend on for existing data are often significantly underfunded and understaffed. Several participants talk about this based on their own experience as data managers:

*It's part of our core work, so there's a recognition that we should be doing this, we should be up to date, but it relies on people in the data management team having the time to do it. There's no dedicated resource. Jove*

### Social-Political

*... the arrangements or resources (e.g., organisational rules; social solidarities; hierarchies; community, familial and organisational relationships) that shape how people relate in a practice to other people and to non-human objects; they enable and constrain the relatings of a practice (Mahon et al., 2017, p. 10).*

A social-political challenge for participants seeking to aggregate archaeological data from multiple excavations was that different

countries have their own archaeological research traditions and these shape their practices:

*There are also, sort of schools even within Mediterranean landscape archaeology, that use also different procedures in the field. Let's say you have more like an Anglo-Saxon tradition, ... that uses initially more rigorous methodologies, as opposed to... let's say, Italian, but also Greek traditions, that are much more oriented at..., topographic research and less systematic collection of artifacts and of mapping sites. Ceres*

Participants also talk about how different excavation teams develop their own practices and conventions, many of them passed down through mentorship and the field and not recorded (see also Olsson, 2016). This is compounded by archaeological reports tending to focus on findings rather than methods:

*When it comes to publishing, I think it's important to publish complete data sets, and also be very clear about how you created your data, because the creation of data also involves making a lot of decisions on sampling. For example, what to include and what to exclude. Hera*

One advantage of a practice architectures-informed approach to information practices research is that it encourages the researcher to focus attention on aspects of practice architectures which impact participants' information practices over which they have no control. A good example of this in a social-political context is the long-standing practice of rewarding scholars (both in terms of prestige but also more materially in terms of promotion and tenure etc.) for being the first to write about a new discovery. This means, as the study's participants acknowledge, that the power dynamics of academic research in the 21<sup>st</sup> century make it understandable for many researchers to be reluctant to make their data available while they are still working on it. Some participants even admitted that this was a problem they themselves faced:

*I'm not saying that you should publish everything straight away, because there are good reasons for it, for keeping things away from public access for some time, especially when you're not completely ready with everything. I mean, I think that's really where things become really tricky, and I mean, also for myself, I mean, my own archaeological data for this project, I haven't put it in a repository mainly for this reason, because I'm still working on it.*

**Heimdall**

## Inter-Related Arrangements

The above examples demonstrate that all three of Kemmis et al.'s (2014) practice architecture arrangements have proved useful conceptual tools for analysing the study's interviews. However, this paper will argue that the usefulness of practice architectures for information practices goes beyond this in allowing researchers to also consider the ways in which the different types of arrangements are inter-related.

For example, the problem of so much of the material uploaded to archaeological depositories being completed site reports in pdf format, and which focus on outcomes rather than practices or providing raw data, can be seen to combine *cultural-discursive* (established reporting conventions), *material-economic* (lack of time and resources) and *social-political* (sharing data on which researchers are working may be against their

own interests). This paper argues that its ability to see disparate practices as inter-related may be practice architecture's most important feature.

## Conclusion

This short paper can only provide a brief overview of the initial findings of the current phase of our research. However, these are already enough to demonstrate that the practice architectures framework provides a useful conceptual tool for information researchers, affording them the opportunity to explore the broader cultural-discursive, material-economic, and social-political arrangements that shape researchers' information practices. It provides a conceptual tool that allows researchers to consider a broad range of arrangements while also interrogating how they are inter-related. We therefore argue that practice architecture can make a significant contribution not only to finding solutions to key issues that have hampered the development of the Open Data movement, but also offers possibilities for new avenues of information practices research.

## Acknowledgments

Capturing Paradata to document data creation and use for future research projects (CAPTURE) has received funding from the European Research Council (ERC) Grant number 818210.

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## Appendix I - Participants

Participant	Country	Position	Research Interests
Hera	Sweden	Doctoral student	Classical archaeology; Pottery/Fabric studies
Jove	UK	Spatial Information Manager	Monuments records; Spatial information
Ceres	Netherlands	Researcher	Classical Mediterranean Archaeology; Field survey
Loki	USA	Researcher	Archaeological Remote Sensing
Odin	Netherlands	Researcher	Roman archaeology; Late Iron Age-Early Middle Age archaeology
Persephone	Netherlands	Researcher	Archaeology of the Greco-Roman Middle East
Ullr	Sweden	Researcher	Visualization of landscapes and archaeological sites
Ra	USA	Researcher; archaeological data manager	Zooarchaeology; archaeological data management and publishing
Saturn	Netherlands	Researcher; archaeological data manager	Archaeological data management; Roman archaeology
Adamma	USA	Professor	Geographically and temporally diverse sites; feminist archaeology
Samas	USA	Researcher	Geographically and temporally diverse sites
Ishtar	USA	Professor	Neolithic archaeology of the Near East
Gilgamesh	USA	Archaeological data manager; systems developer	"Digital archaeology" and photogrammetry
Valli	Netherlands	PhD student	Paleoenvironmental data
Heimdall	Netherlands	Assistant Professor	GIS; Spatial analysis; Modelling

<b>Kinh</b>	<b>USA</b>	<b>Associate Professor</b>	<b>Pleistocene archaeology of Mainland Southeast Asia</b>
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