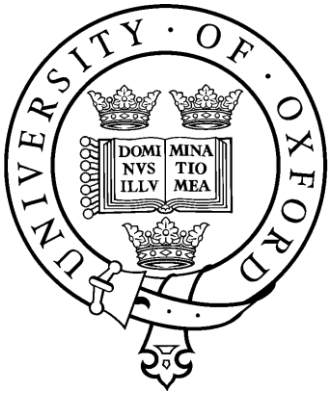
Temporal mobility: Context and routine in museum documentation



Jessica A. Stitt
Green Templeton College
University of Oxford

A thesis submitted for the degree of
DPhil Management
Michaelmas Term 2022

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Jessica A. Stitt
Green Templeton College, University of Oxford

Abstract

Organisational information resources have temporal mobility if they are able to traverse temporal knowledge boundaries and remain usable over time. Information resources – digital and physical records and data – can be vital for on-going productivity and decision-making in an organisation, and some information resources are retained as organisational memory to inform the maintenance and development of performance in the long term. Organisational records are also managed and maintained for regulatory reasons of accountability and transparency, or to secure organisational legacy. In particular, within scientific communities, datasets need to be accessible in the long term to a globally dispersed network of researchers.

For information resources to be useable, recipients need to understand the circumstances in which they were created: when, where, why and by whom; i.e. the provenance of the records. This contextual information helps users interpret information content and translate it for use, and lack of context hampers the temporal mobility of records. This research looks closely at the role of context in the use of information resources after the passage of time, to investigate what aspects of context are significant and how context affects interpretation and use.

Through participant observation, I studied how information resources were used during the accessioning of archaeological artefacts at a museum. In this thesis, I examine the accessioning task in detail, using routines as an analytical perspective to draw out the intricacies of how different aspects of context were used when interpreting documentation records from the past. This autoethnographic study draws heavily on my personal experience of the performance of the task and the difficulties in completing it.

The findings of my research highlight the significance of understanding how records were created, not just their provenance. Our understanding of aspects of the documentation routine greatly facilitated our interpretation and use of past records. The routine and our understanding of it was an important contextual element that contributed to the temporal mobility of the records. This has implications for the long-term management of information resources suggesting that there is value in augmenting descriptive metadata with contextual information on generative processes to facilitate long term use of information and data content.

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Acknowledgements

This research would undoubtedly not have happened without the persistence, encouragement and support of Anna Bülow. It is not an exaggeration to say that this thesis owes much to our collaborations and conversations over the years. I am immensely grateful for her continuing friendship and guidance. I am also especially indebted to my supervisors, Janet Smart and Pegram Harrison, for their invaluable support and academic advice from the outset of this project. They have been unfaltering in their confidence in me, which has been greatly reassuring over the years. My thanks go to the numerous faculty from Saïd Business School who took the time to discuss my ideas and offer advice. I am particularly grateful to David Feeny for mentoring and guiding me through various difficulties. His comments were always insightful and always welcome.

I am indebted to all who participated in my research, in particular the staff at Museum A. They were unfailingly generous with their time, and I greatly appreciated their candour. Data collected during my fieldwork is reproduced here with the Museum's consent.

I was fortunate to receive generous financial support from several organisations. I gratefully acknowledge funding from the Arts and Humanities Research Council under the Collaborative Doctoral Awards (CDA) Scheme (AH/M004589/1). I also benefited from financial and research support from the CDA partner organisation, The British Museum. In addition, I am very grateful for the financial support I received from the Saïd Business School Foundation.

Lastly, profound gratitude goes to my husband, Alan, whose patience and understanding made this thesis possible.

1 Introduction

Organisations are inherently sites of collective endeavour, requiring collaboration and coordination between individuals and groups. This necessitates sharing of expertise and experience, and an organisation's capability to leverage organisational knowledge has been directly linked to success and organisational advantage (Nahapiet and Ghoshal, 1998; Teece and Al-Aali, 2011).

Due to increasing internationalisation and fragmentation, internal organisational collaboration can be temporally and geographically dispersed, presenting particular challenges (Argote et al., 2011). These challenges can be ameliorated to some extent by the communication afforded by technology. However, the innate boundaries of distributed collaboration are cultural and social as well as technical (Olson and Olson, 2000). Non-synchronous, temporally distributed working presents particular difficulties because the passage of time prevents social interaction between collaborators.

The view of organisations as 'social communities' (Kogut and Zander, 1992, 384), and the significance of social dynamics in organisations for the management of organisational knowledge is a significant theme in knowledge management literature (Argote et al., 2003; Newell, 2015; Wang and Noe, 2010). But when organisational members are separated by

time, they may be entirely reliant on information resources[1] for pooling and developing shared knowledge.

The contribution of this study is to examine the temporal mobility of information resources, providing a detailed insight into how they are used after several decades, and in particular the role of context in long term reuse. This has implications for the management of organisational information resources that are purposefully shaped and managed to facilitate future use.

The challenges of non-synchronous collaboration are particularly pertinent to scientific communities where collaboration is long term and data sharing is key (Baker and Bowker, 2007; Karasti et al., 2010; Ribes and Finholt, 2007). However, this study is relevant to any organisation with a need to retain and reuse information resources in the long term, for example public sector and third sector organisations retain records for accountability and transparency but also for legacy (Shepherd, 2006), such as the police service (Brown, 2001), hospitals (Nicholson, 1996) and charities (Dawson et al., 2004).

Elsewhere, long term management of information resources is a requirement in regulated industries such as social care, pharmaceuticals (Chalmers, 1989), the oil industry (Bullen, 1990), and the financial industry (Lannon, 1991). There are also specific scenarios where planning is inherently long term, such as with large scale infrastructure projects (Edmonds

[1] The phrase 'information resources' (T. D. Wilson, 2002) is used to refer to any form of knowledge articulated in tangible form that can be stored and distributed, so includes all forms of data and documentary record, digital and paper.

and Lo, 1997; Nycyk, 2008) or forensic DNA databases (Jeuniaux et al., 2015) In all of these examples, information resources need to be managed not just to survive in the long term, but also to be usable.

Lastly, in museums, information resources are retained long term because artefacts and specimens are preserved in perpetuity, and so the records concerning those artefacts must also be preserved. My research stemmed from a real-world problem regarding museum documentation, therefore a museum was the research setting, and the findings have direct implications for information management in museums.

1.1 The practical problem: Documentation backlogs in museums

This research started with a practical problem facing the museums sector: documentation backlogs, whereby the documentation records of the collection are incomplete. A review of the practitioner literature and some initial exploratory research found this to be a prevalent and persistent problem amongst museums in the UK (Holm, 1993; National Audit Office, 1988; Roberts, 1986). For example, a regional survey found that 57% of museums in South East England reported having such backlogs (Taylor, 2004).

This is not a recent phenomenon. The British Museum was criticised by a parliamentary committee in 1835 for the incomplete state of its catalogues (Select Committee on the British Museum, 1835), and in the early 1700s the Royal Society in London failed to maintain catalogues of its collection (Simpson, 1984). This phenomenon is not restricted to UK museums, for example, the Smithsonian Institution in the US has reported that of its nearly 144 million museum objects across its 19 museums, less than 40% are inventoried (Smithsonian Institution: Office of Policy and Analysis, 2005,

111). Incomplete documentation records severely compromise a museum's ability to utilise its collection for public benefit (Harrison and McKenna, 2008); see also International Council of Museums Code of Ethics, (2017). The consequences of documentation backlogs are explored in Chapter 2 (Section 2.3).

At the outset, this study aimed to understand the causes of such backlogs and why they were apparently difficult to resolve. However, during the phase of exploratory research it quickly became clear that rather than museums having incomplete records of their collection, museums were replete with records. So rather than a museum not 'knowing' what was in their collection, there was no shortage of collection knowledge. The problem was locating that knowledge, representing it and integrating those representations in a coherent way for organisational use. This was therefore an information management problem. The focus of my research shifted towards the museum documentation task itself, with the broad research question: what difficulties are associated with the museum documentation task? And the related question: what factors influence these difficulties?

Through participant-observation of a documentation task at a museum and subsequent detailed analysis, I explored how pre-existing documentation records were reconciled to match up with each other and with the artefacts. This involved the reuse of records that were up to 45 years old. The same group of artefacts had been documented at least three times, and despite the same information being recorded about the same artefacts, the resulting information content could vary significantly. The reuse of these information resources after the passage of time therefore required interpretation to understand the discrepancies between them. My analysis highlighted the significance of understanding the circumstances in which records were created for their interpretation and reuse. The

contribution of this research is to demonstrate and define the significant role of context in the temporal mobility of information resources, that is, the interpretation of information resources after the passage of time.

1.2 Theoretical context

1.2.1 Information resources as organisational memory

Within knowledge management literature, information resources are often seen as a form of organisational memory (Alavi and Leidner, 2001; Anand et al., 1998). This is knowledge that has been articulated, codified and formalised, and given tangible form which can then be stored and disseminated (Blackler, 1995; Boisot, 1998; Spender, 1996). Organisational memory has the potential for future use, when it can be applied to inform decision making (El Sawy et al., 1986; Stein and Zwass, 1995; Walsh and Ungson, 1991). Perspectives on the role of organisational memory in learning posit that the reuse of organisational knowledge is not only beneficial but essential for organisational success.

Apart from the use of organisational memory for decision making, organisational memory can have a more mechanistic function where information and data are seen as a raw material, an organisational asset that informs operations (Blair, 1984; Levitin and Redman, 1998). Information resources can be integral to organisational processes and thoroughly embedded in activities such as financial transactions, risk assessment of chemical products, or the production of custom-made glasses (Wang et al., 1998). Such information and data are essential for organisational effectiveness, constantly updated and used (Storey et al., 2012; Zack, 1999), and can also have a managerial function for monitoring and managing performance (Yates, 1990).

Within archival science, and the related discipline records management, organisational use is considered the primary purpose of records. Records are process-bound information, created to support legal and administrative organisational work and inextricably linked to organisational functions. These records provide the evidence for organisational decision-making (Gilliland-Swetland, 2000; Thomassen, 2001). However, there is a secondary function of records and archives which is their evidential value to ensure that organisations are accountable in future. When retained permanently, records, the constituent elements of archives, are a source for historical research (Schwartz and Cook, 2002).

Business archives are not just repositories of interest for historical research but have organisational relevance. For example, organisations can avoid repeating past failures, or reinventing the wheel (Alavi and Leidner, 2001; de Holan and Phillips, 2004), while in the longer term, organisations can learn from examining their corporate history (Delahaye et al., 2009; Nissley and Casey, 2002; Smith and Steadman, 1981). Learning from organisational memory can lead to sustained competitive advantage and organisational success, while organisational forgetting has negative consequences for planning, productivity and competitiveness (de Holan and Phillips, 2004; Fernandez and Sune, 2009).

Not everything can be kept, so archival and records management practice aims to select and retain records on a time-limited or permanent basis through the practice of appraisal, and by managing the life cycle of records. Records that pass out of active use are regularly appraised and may be retained and reappraised in future, or disposed of (Healy, 2001; Joseph et al., 2012). This approach encompasses all organisational information resources

from corporate publications and operational data, to informal communications such as memos and faxes (Louhiala-Salminen, 1997; Yates, 1989).

1.2.2 Information as decontextualised knowledge

The storage and reuse of organisational memory is greatly facilitated by organisational memory information systems (OMIS), which includes a wide range of applications from communication systems, databases and knowledge repositories (Nevo and Wand, 2005; Stein and Zwass, 1995). These information systems can provide the infrastructure to capture, refine, store and present information content as well as supporting interactions between organisational members. Information technology can therefore be both integrative and interactive (Zack, 1999) and, as is the case with all information resources, OMIS can deliver information content to organisational members regardless of time or location (Hayes, 2011).

Literature on OMIS tends to focus on technical aspects, viewing information content as tokens to be manipulated and processed (Hayes and Walsham, 2003; McKinney and Yoos, 2010). This view stems from a traditional hierarchical perspective that sees knowledge, information and data as separate distinct entities. Data are raw facts and numbers, recorded as observations and representing the real-world state, or at least the real-world state as viewed by the user (Wand and Wang, 1996). Information is 'data endowed with relevance and purpose' (Drucker, 1988, 4), in other words, data that has been analysed and understood, and is therefore meaningful. Knowledge, in relation to information, is what we can meaningfully infer from information. The interpretation of information draws on subjective experiences and perceptions and so is personal to the individual (Alavi and Leidner, 2001; Boisot, 1998; Davenport, 1997; Newell et al., 2002). So, while knowledge

is tacit and personal, information and data exist outside the human mind, are explicit and objectified (Nonaka and Takeuchi, 1995; Schlogl, 2005; Spender, 1996; Wilson, 2002).

However, from an organisational memory perspective, information is not derived from data but is knowledge that has been articulated and given tangible form. Tuomi describes this as the 'reversed hierarchy' (Tuomi, 1999, 107), arguing that if our understanding of the world around us is socially constructed (Berger and Luckmann, 1966) then data are observations that are mediated by constructs. Raw data does not pre-exist as a real-world state waiting to be observed and measured. Instead, data exists only after information exists, and information is knowledge that has been codified and decontextualised. According to Tuomi, the codification of knowledge is carried out against a backdrop of a 'meaning structure' (Tuomi, 1999, 105). The resulting information is decontextualised knowledge because the meaning structure remains in the background and is not captured (ibid).

Tuomi's reversed hierarchy not only aligns with the organisational memory view of codified knowledge but is also entirely compatible with the traditional hierarchical view because, according to Tuomi's reversed view, the reuse of data and information requires recontextualisation. Through integration into the recipient's meaning structure, data and information are interpreted and rendered meaningful, thus adding to the personalised knowledge of the individual. Tuomi's reversed hierarchy therefore models the process of decontextualisation, while the traditional hierarchy models the process of recontextualisation. In this way, organisational knowledge is recorded, stored and then reused.

1.2.3 The problem of reuse – knowledge boundaries

The first implication of decontextualisation and recontextualisation is that repositories of organisational memory do not store meaning, because the context that makes it meaningful is not captured (Spender, 1996). So, while information resources may function as organisational memory, they do not represent knowledge. Knowledge cannot be reliably extracted from an individual (Alvesson and Kärreman, 2001), and the process of codifying knowledge can never capture everything (McDermott, 1999; Swan, 2011).

More specifically, the implication for organisational memory is that an OMIS does not store knowledge, and so the idea that information systems can be used for managing the sharing or transferring of knowledge is erroneous (Galliers and Newell, 2001). Information systems manage information and data, not knowledge, and so the management of organisational memory requires the effective management of meaning, rather than management of codified representations (El Sawy et al., 1986; Wilson, 2002).

The second implication relates to how meaning is to be managed when information resources are not intrinsically meaningful. For Tuomi, the interpretation and reuse of information resources requires the recontextualisation of content into the context that has been stripped away during codification. This implies that the recipient of the information must share the same underlying knowledge base (Tuomi's 'meaning structure') as the originator (Alavi and Leidner, 2001), thus the interpretation and reuse of information resources requires the management of the shared understanding that forms the context in which information resources are shaped and reused (Tuomi, 1999).

This in turn implies that information will be meaningless to those who have a different knowledge base. This is a perennial problem in studies of knowledge sharing (Blackler, 1995; Boisot, 1998; Nahapiet and Ghoshal, 1998; Newell et al., 2002) since organisational memory is often reused in different contexts to that in which it was created (Bannon and Kuutti, 1996; Tsoukas, 1997). Meaningful sharing of information resources is a necessity for cross-functional collaborative and cooperative work but can be hindered by knowledge boundaries between groups (Sonnenwald, 1995).

Davenport lists six factors that can adversely affect the distribution and reuse of information resources: politics, strategy, behaviour or culture, staff, processes and architecture (Davenport, 1997). These factors are contextual dimensions that can impede collaborative work by constituting and shaping the interpretive frame, or 'thought world' of a group or community (Dougherty, 1992). The interpretive frame evolves through social learning within each community and is manifest not only in shared assumptions, attitudes and identity, but in shared practice and language (Beth Bechky, 1999; Brown and Duguid, 1991; Fish, 1980; Lave and Wenger, 1991; Wenger, 2000). Knowledge therefore resides not only in individuals, but in communities of practice (McDermott, 1999; Wenger, 2000); and different communities, such as different occupational groups, will have a different world view (Bechky, 2003; Orr, 1996). Collaboration between different groups requires spanning the knowledge boundaries between them.

Knowledge boundaries are characterised as having physical, cognitive and social dimensions (Hara and Fichman, 2014). In the literature, the mental (for example, skills and expertise), cultural (for example, beliefs, identity, norms) and political (for example, organisational legitimacy and power) aspects are emphasised (Carlile, 2004; Hernes, 2004;

Sturdy et al., 2009; Wright, 2009). This is unsurprising since the effects of these aspects are observed as being particularly salient in ethnographic studies of boundary dynamics, such as those by Bechky (1999, 2003), Orr (1996) and Carlile (2002). More recently, there has been increasing interest in the dynamics of non-collocated, geographically dispersed groups such as virtual teams – a reflection of technology's impact on communication capabilities (Argote et al., 2011; Hinds and Bailey, 2003; O'Leary and Cummings, 2007; Olson and Olson, 2000).

Just as geographic distance has a profound effect on boundary dynamics, so does time. The context in which an information resource is used will be different from the context in which it was created simply because use takes place after creation, and memories are never recalled in the same context in which they are stored (Bannon and Kuutti, 1996). A document can act as an aid to memory, mitigating for the passage of time (Buckland, 2018). However, cognitive psychology studies have shown that recall is distinct from memorising, the corollary being that even for an individual making use of their own personal information resources, use does not reconstruct or recreate memory (Rowlinson et al., 2010). The implication for information resources is that not only does the context of use differ from the originating context, but also knowledge boundaries can form within the same individual or community as meaning structures change over time, and this has an impact on interpretation (Buckland 2018), for example, an individual can struggle to understand their own notes after only a month (Markus, 2001).

Both time and space are boundary dimensions that are of particular interest in Computer Supported Cooperative Work (CSCW) since information systems can be designed to effectively address both (Reddy et al., 2006). Study of scientific collaboration is

particularly relevant because of the temporally distributed nature of scientific collaborative work, and also the role of digital information infrastructures in supporting that work (Karasti et al., 2010; Star and Ruhleder, 1996; Van House and Churchill, 2008). However, the challenges of information reuse apply to information resources of all forms, whether digital or not.

An understanding of the role of the temporal dimension in boundary dynamics is needed not just to manage the reuse of information resources within and between communities after the passage of time, but also to realise the value of organisational memory retained long term more generally.

1.2.4 Crossing knowledge boundaries: Information resources and translation

Tuomi's model of decontextualisation and recontextualisation implies that shared understanding is a prerequisite for information resources to be shared, interpreted and reused. However, information resources can be reused by recipients in different communities through the act of translation. Through translation, the interests of one are translated into the terms of another (Brown and Duguid, 1996). In other words, translation enables information resources to cross knowledge boundaries.

In science and technology studies (STS), the concept of translation refers to the sensemaking of multiple actors within a scientific or technological community. According to actor-network theory, also known as the sociology of translation, knowledge is the product of a heterogeneous network that includes individuals and all the non-human material that they interact with (Law, 1992). Translations are dynamic and changeable, and

involve 'mutual definition and inscription' (Callon, 1990, 143) so should be seen as a social process (Freeman, 2009).

More broadly, the term has been used to refer to activities that enable information resources to be meaningful to multiple communities (Bannon and Bødker, 1997; Brown and Duguid, 1996; Gasson, 2005). It has also been used to specifically refer to types of knowledge work for communication across knowledge boundaries (Carlile, 2004), or for meeting the needs of information seekers (Schultze, 2000). Translation efforts are therefore acts of interpretation that occur at boundary junctures, carried out by actors on either side of the boundary, and sometimes facilitated by a third party or broker.

In studies of boundary dynamics, information resources are often viewed as 'boundary objects' or 'translation devices' (Huvila et al., 2017, 1808) that become the focus of translation efforts. Boundary objects are a locus for common understanding in collaborative work since they are able to articulate shared meaning while retaining local relevance for different communities (Star and Griesemer, 1989). When an information resource successfully functions as a boundary object, information content is interpreted differently by different groups and has different meaning in different contexts (Halverson and Ackerman, 2003; Oswick and Robertson, 2009), or is understood differently by different groups working within the same context.

Empirical studies often investigate high-velocity, high-stakes settings, characterised by synchronous and collocated working such as new product development (Carlile 2004) or an air traffic control room (Halverson and Ackerman, 2003; Landry et al., 2009). Such settings stress the importance of social interaction to assist common understanding (see

also ethnographies by Orr 1996; and Doolin and McLeod, 2012). The significance of social mediation is further highlighted by Sapsed and Salter, who found that that the lack of social interaction in geographically distributed teamwork was a barrier to the successful use of project management tools (Sapsed and Salter, 2004). The challenge when using information resources across a temporal boundary is that the recipient may be completely isolated from the originating milieu. In the absence of social interaction to mediate the interpretation of information and data, translation efforts over time are restricted to those that take place at the time that the resource is created, and at the point of use when the user must translate for themselves.

1.2.5 The shaping of information resources for temporal mobility

Information resources are purposefully shaped in anticipation of future use through the process of 'packaging' (Bannon and Bødker, 1997; Hertzum, 1999; Markus, 2001). This can be viewed as a translation effort because the aim is to facilitate information resources in crossing temporal knowledge boundaries. Packaging activities take into account the expected 'trajectory of use' (Ackerman and Halverson, 2004, 181) and can take any form of authoring and editing of information content (Markus 2001). However, there are tensions between the need to decontextualise and the need for context in order for information content to be usable; and the need to stabilise information content while retaining flexibility of interpretation.

Information resources have 'interpretive flexibility' when they retain the ability to be interpreted differently by different recipients (Doherty et al., 2006; Sahay and Robey, 1996). According to Star and Griesemer, interpretive flexibility is not the same as consensus, but is achieved by retaining 'traces of multiple viewpoints, translations and

incomplete battles' (Star and Griesemer, 1989, 413). The packaging of an information resource can achieve interpretive flexibility through selective codification so that extraneous details are omitted, and the resulting information content is more generalised. For example, fashion designers selectively shared information with manufacturers to avoid introducing errors by providing too many measurements (Markus 2001); similarly, Halverson and Ackerman's 'cheat sheet' synthesised data on air traffic patterns so effectively that it was used by three different groups at the airport where it was devised, and by at least one airline (Halverson and Ackerman, 2003).

The exclusion of extraneous information is a form of decontextualisation since it involves the omission of contextual details. However, while this can enhance interpretive flexibility, and therefore temporal mobility, this can also have negative consequences for subsequent use (Ackerman, 1998; Anand et al., 1998; Nevo and Wand, 2005; Stein, 1995). For example, in Ackerman and Halverson's study of Answer Garden, lack of contextual information affected the users' perception of the authoritativeness of the information content (Ackerman, 1996). Rationales, in particular, can be lost (Gruber and Russell, 1996).

Decontextualisation, when taken too far for the sake of expedience, can result in an information resource that is meaningless (Alavi and Leidner, 2001; Markus, 2001). It therefore needs to balance the flexibility afforded by recording with brevity with the potential for loss of relevant information. This can be more easily achieved when authors are familiar with the intended audience. For example, doctors use an abbreviated lexicon in expectation that the recipients of patients' records are also doctors and so have the same shared understanding (Heath and Luff, 1996; Hertzum, 1999). The knowledge boundaries

are considerably more manageable when sharing information resources within the same community.

Decontextualisation through packing involves creating the public 'face' of a document, so can involve sanitising, self-censoring and formalising (Markus 2001). This can be an effortful, burdensome task. Baker and Bowker described it as an 'altruistic act' (Baker and Bowker, 2007, 133) for a scientist to package their data for reuse by someone else. Elsewhere, team members were overwhelmed by documentation such as writing keywords (Majchrzak et al., 2012, 2004); similarly, Orlikowski found the effort required for sanitising to be onerous for her research participants (Orlikowski, 1995). Since packaging is selective it can be politicised when alternatives are deliberately repressed (Bowker and Star, 1999). It can therefore be a strategic weapon, a means to control narrative (Neu et al., 1998; Nissley and Casey, 2002; Power, 2003; Vaara et al., 2010), and a way to reinforce boundaries by 'patrolling and controlling' (Brown and Duguid 1996), for example through use of particular language and conventions). Furthermore, choices can become locked in, so selection can be a 'powerful cognitive and behavioural commitment' (Boisot 1998, 45).

1.2.6 The context of use

Users rely on context for effective interpretation. The challenge in designing packaging is to make informed decisions when shaping information resources for temporal mobility. However, each potential use in a different context could require different packaging and the creator of the information resource cannot know all the possible uses for their information resource (Hertzum 1999). One way to inform the packaging process is to approach the design of an information resource as an iterative developmental process,

involving collaboration between system designers and users (Kaltenbrunner, 2014; McLeod and Doolin, 2010).

The meaning of an information resource is not restricted to the interpretation of content. Documents can acquire meaning from their physical arrangement in 'piles' or files (Lansdale, 1988; Malone, 1983). Documents can also function as 'epistemic objects' with meaning situated within socio-material assemblages, as seen in the use of photographs, maps and graphs by insurance underwriters (Jarzabkowski et al., 2013; see also Orlikowski, 2010). The socio-material perspective focuses on the ways in which materiality (technological or otherwise) is shaped by practice but also how practice is shaped when materials are in use, to the extent that 'the social and material are constitutively entangled' (Orlikowski, 2007, 1437; Leonardi, 2012; Tyre and Orlikowski 1994). This is seen in studies of documentary genres used for communication which have been shown to be entangled with practice in this way, such as memos (Yates, 1989) and faxes (Louhiala-Salminen, 1997). Documents can be so embedded in practice that workflow is inscribed directly onto them during use (Mambrey and Robinson, 1997). These examples show that recontextualisation does not just involve reinterpretation in a context that diverges from the context of creation, but that flexibility refers to mode of use as well as interpretive flexibility of content.

However, the use of information resources can be well-defined and predictable, as in the use and filing of purchase orders (Malone 1983) or the processing of invoices (Pentland et al., 2011). Repetitive, routine modes of use are an opportunity to study the use of information resources in detail due to the potential to observe patterns of action (Becker and Zirpoli, 2008; Cohen et al., 1996; Pentland and Feldman, 2005). In this empirical

study, I analyse the real-world use of information resources to examine the role of context in the temporal mobility of records: what aspects of context were needed for interpretation, and how those aspects of context affected the interpretation of the records. Using routines as an analytical perspective, I examine the museum documentation task. This task involved using multiple information resources and artefacts in the construction of the museum documentation record. An understanding of the circumstances in which the records were created was crucial to enable interpretation of the content and reconciliation of the records with each other and with the artefacts.

As Star and Bowker point out, mobility does not equate to flexibility when the recipient does not know enough about the information content (Star and Bowker, 2010). The contribution of this research is to bring empirical insight to how context aids interpretive flexibility over temporal boundaries. This has implications not only for the construction of museum documentation, but also for our understanding of the use of information resources.

1.3 Research approach

The research approach for this study reflected the exploratory nature of the research question as I sought to understand the factors influencing the museum documentation task. When embarking on my fieldwork, my research questions were: what difficulties are associated with the museum documentation task? (how is it difficult); and also, what factors influence these difficulties? (why is it difficult). These 'phenomenon-driven' research questions were deliberately broad in scope to maintain flexibility in the field (Eisenhardt and Graebner, 2007, 26), where the guiding methodological approach was one of discovery: maintaining openness about unexpected outcomes and without preconceived ideas about what data would be collected (Locke, 2011).

During this research, my approach to answering the research questions was to 'follow the data' (Edmondson and Mcmanus, 2007, 1163), working inductively to build nascent theory from my observations and experiences. My theoretical contribution was therefore grounded in the data, generated by discerning emergent patterns and themes in my empirical findings (Eisenhardt, 1989; Langley, 1999). This 'theory-building' approach is particularly suited to answering exploratory 'how' and 'why' questions where no specific hypothesis is being tested (Eisenhardt, 1989; Eisenhardt and Graebner, 2007).

Throughout my research, I adopted an interpretive standpoint, with the view of knowledge as socially constructed (Berger and Luckmann, 1966). At the core of the empirical findings was my personal experience of the documentation task, rather than an attempt to define some pre-existing factual truth about documentation and its challenges. This focus on subjective experience is a key characteristic of interpretive qualitative inquiry (Prasad and Prasad, 2002), but is also in keeping with the broadly held view of the nature of museum knowledge as interpretive and subjective, since there are innumerable ways to 'know' a museum object (Bearman, 2008; Hooper-Greenhill, 1992; Keene, 2005; Sharon Macdonald, 2006).

This stance is at odds with the position held in some areas of the information systems field that views an information system as a representation of 'known aspects of the real-world' (Wand and Wang, 1996, 88; see also Capurro and Hjørland, 2003). This position is echoed in museum informatics literature that sees information as embodied in museum artefacts and waiting to be extracted and recorded (Orna and Pettitt, 1998, Figure 2.2; see also Marty and Jones, 2008). However, the social constructionist view is integral to the analytical

ethnographic methods of this thesis that maintains that the subjective experience of the participant-researcher is a valid starting point from which to theorise.

1.4 Structure of the thesis

This thesis is structured to present a 'theorised storyline' that places empirical field-based findings centre stage, structured according to a theoretical framework (Golden-Biddle and Locke, 2007). The overall aim with this approach is to present rich empirical observations integrated with theoretical explanations. This reflects the process of 'enfolding' the findings with the literature whereby connections with existing theory developed as issues and themes emerged in the course of data collection and analysis (Eisenhardt, 1989). These connections are maintained in the thesis in the way that the literature is intertwined with the empirical findings rather than separated out into conventional literature review and findings chapters (Eisenhardt and Graebner, 2007; Locke, 2001).

Throughout the theorised storyline, the focus is on the documentation task itself and my experience of performing this task. The structured narrative of my empirical observations serves as a constant reminder of my role as participant-researcher, demonstrating the authenticity of the findings as drawn from my personal experiences. According to Locke, this authenticity, along with the coupling of findings and theory, are the two key dimensions when writing about theory grounded in qualitative data (Locke, 2001).

The thesis is structured as follows: Chapter 2 provides an introduction to the museums sector in the UK, defining museums as sites for the development of curatorial knowledge, and discussing the significance of that knowledge for museum operations. The chapter also provides background to the purpose and processes of museum documentation. Chapter 3

starts with a methodological discussion, linking my research methods with the research problem and research questions. The chapter goes on to set the scene with an introduction to the fieldwork setting, Museum A, and an account of how I entered the field, the fieldwork conditions, and ethical considerations. I then introduce routines as an analytical perspective and demonstrate how I used Pentland and Feldman's theoretical model of routines as the basis of my analysis of the documentation task.

During the documentation task, several sets of records were used – records that were created at different times over the past 45 years. Chapters 4, 5 and 6 describe the ways in which these records were used in the completion of the documentation task. Chapter 4 looks at the provenance of the records, chapter 5 looks at how the records were made, and chapter 6 looks at how these aspects of context affected the use of the records. The thesis concludes in the final chapter with a discussion of the findings, and implications of this research.

2 Information ecology of museums

Museum documentation consists of the records created to document the artefacts in a museum collection.[2] These records are used to support activities at a museum in identifying, locating and tracking the artefacts. These are therefore essential organisational information resources for managing the collection, and documentation activities are an organisational necessity for a museum.

Documentation records can be seen as part of an information infrastructure, not just in the way that a documentation information system (the collection management system, CMS) integrates information that is dispersed across the museum, but also in the way that it connects organisational groups and activities. In infrastructure studies, infrastructure includes such integrative systems but also the practices and other information resources associated with those systems (Baker and Bowker, 2007; Star and Bowker, 2010; Star and Ruhleder, 1996). In the case of museum documentation this includes the CMS that provides access to collection information for groups across the museum, but also to the documentation practices and museum artefacts that contribute to that system (Huvila, 2013).

[2] The dictionary definition of an artefact is an object created by a human, but museums also hold collections of biological and geological specimens, that is, objects from the natural world. The word 'artefact' is used in this thesis to refer to all museum objects, partly for the sake of brevity, but also because items that enter a museum collection become 'musealia' (van Mensch, 1990). In other words, all museum objects are human constructs because they have been purposefully placed in the museum context.

An information infrastructure is part of a wider information ecology, an STS concept that incorporates the local groups and practices that generate data; communities that process and integrate the data and learn from it; and networks of global partners through which data are standardised and distributed (Baker and Bowker, 2007). This ecological model can be applied, albeit on a small scale, to a museum with multiple curatorial communities (archaeologists, anthropologists, social historians, art historians). Within these communities, individuals and groups embark on data collection projects through fieldwork to collect artefacts or specimens, and research projects. Data from these projects are synthesised by the community and integrated into current learning. The data can then be distributed within the museum via a CMS, a bespoke information system, and this requires representation in a standardised form. The effort required to integrate curatorial information into a centralised CMS is challenging in similar ways to the integration of distributed knowledge in the scientific community (Bowker, 2000a, 2000b; Van House, 2002). These activities, the resulting information resources, and the associated practices, constitute the information ecology of a museum.

To understand the challenges of the documentation task, it is first necessary to understand the museum setting and how documentation fits in to the wider information ecology concerning information about the artefacts in a museum collection. This chapter starts by introducing the museums sector in the UK and the purpose and activities of museums. This is followed by a discussion of the nature of knowledge associated with the museum collection, knowledge that resides primarily with museum curators. The third section looks at museum documentation, purpose, processes and its role as information infrastructure.

2.1 Museums in the UK

According to the Museums Association, the professional body for museum professionals in the UK, ‘museums are public-facing, collections-based institutions that preserve and transmit knowledge, culture and history for past, present and future generations' (Museums Association, 2015, 2). There are about 2,600 museums in the UK (Mendoza, 2017) and it has been estimated that there are at least 200 million artefacts in museum collections in England and Wales (Keene, 2008).[3]

Museums are often categorised according to the nature of their collection, for example, a natural history museum holds a natural history collection, an art museum holds a collection of artworks.[4] However, more commonly, museums in the UK are categorised according to the nature of their funding and governance. This is typically either at a national level (receiving funding from UK government), local level (receiving funding from local authority), independent (usually owned by a charity), or as part of a university (Museums and Galleries Commission, 1994). The museums sector also includes historic properties such as castles and stately homes, and archaeological sites (see also Mendoza, 2017). However, it does not include libraries and archives, whose collections are primarily text-based.[5]

[3] Despite the plethora of reports and statistics that cover the museums sector, figures are usually not directly comparable because some refer to the UK, some to only parts of the UK such as England and Wales or only England.
[4] Arts Council England has published a full list of types of museums in England (Arts Council England, 2015).
[5] Definitions can vary, for example, the US considers collections of live specimens to be museums, such as zoos and botanical gardens (American Alliance of Museums, 2000).

A recent review concluded that over the past ten years an average £844 million per year of public funding has gone to museums (Mendoza, 2017, 7). This includes grants from the National Lottery and tax relief. However, public subsidy has reduced dramatically in recent decades and accounts for only a fraction of the funding needed (National Museum Directors' Council, 2015). This means that museums must generate revenue themselves through donations, corporate sponsorship, and commercial activities. It has been government policy since 2001 not to charge for admission to any of the fifteen national museums in England, despite these museums receiving many millions of visitors (Martin, 2003).[6]

A UK-wide standard for museums was introduced in the 1980s. This is now known as Museum Accreditation and is a scheme run by Arts Council England with well over 1,700 museums currently participating (Arts Council England, 2022). In order to be accredited a museum must meet the standard in three areas: governance and management; the management of the collection; and engagement with users (Arts Council England, 2018b). Museums must demonstrate that they meet the standard when they apply for accreditation and may lose their accreditation if they subsequently fail in one of the areas.

[6] In 2014-15 national museums received 48.19 million visitors (National Museum Directors' Council, 2015, 7)

2.1.1 Saving for the nation

'Heritage is our legacy from the past, what we live with today, and what we pass on to future generations. Our cultural and natural heritage are both irreplaceable sources of life and inspiration.' (UNESCO World Heritage Centre, 2019).[7]

The broadest definition of cultural heritage encompasses the preservation of and engagement with the past (Hoelscher, 2006). This includes all aspects of culture, both tangible (such as the built environment, artefacts and monuments) and intangible (such as performing arts, language and traditions) (Pye, 2001). The idea of preserving, that is, 'saving' culture for the future is central to the concept of cultural heritage. However, not everything can be saved, so heritage assets are selected for preservation from the wide gamut of all things cultural.

This raises the question of who decides what is worth saving and on what basis these decisions are made. In a museum, decisions about what to acquire, and therefore what is culturally valuable and worth saving, are made by curators. In 17th century Europe, artefacts and specimens were collected in pursuit of scientific truth (Hooper-Greenhill, 1992; Macdonald, 2006), but today museum collecting is recognised as a practice that involves the construction of meaning and therefore is situated, subjective, and can be contested (Knell, 2004; Macdonald, 2006; Pearce, 1992; Vergo, 1989).

[7] UNESCO: United Nations Educational, Scientific and Cultural Organization

2.1.2 The collection as an organisational asset

The collection is central to the identity and activities of a museum. However, it is distinct from conventional organisational assets in several respects. Firstly, a museum collection is an entity that can exist independently of the museum (Pearce, 1992). For example, a museum may be brought in to existence in order to manage a pre-existing collection, as was the case with the founding of the British Museum in 1753 (Wilson, 2002). A collection may also continue to exist after the museum has closed down if it is transferred to another museum or organisation (Museums Association, 2017). It is therefore an oversimplification to see a collection as an asset that is assembled by the museum to be exploited in pursuit of organisational goals.

Secondly, in the UK there may be legal restrictions on what a museum can do with its collection if it is deemed inalienable. The UK national museums are not the de facto owners of their collections because the collections are 'held in perpetuity for the nation' (DCMS, Department for Digital, Culture, Media and Sport, 2017, 17) meaning that they are national assets, not organisational assets (National Museum Directors' Council, 2003). Inalienability not only means that the museum does not own the collection, but also the collection has no realisable financial value to the museum.[8] In practice, this means that the monetisation and disposal of collections is approached with extreme caution, for example, the break up and financial disposal of a collection after museum closure is considered

[8] In an exemption, museums are not required to report the financial value of their collection on their balance sheet (Accounting Standards Board, 2009).

potentially unethical by the Museums Association and to be avoided (Museums Association, 2017).

Finally, there is striking evidence that museums only use a tiny fraction of their collections. According to a recent report by DCMS, the V&A museum has 25% of its collection on display, the Science Museum Group has only 5% on display and the British Museum displays a miniscule 1% of its collection (DCMS, 2017). While these figures seem extreme, they are more reasonable when viewed in relation to the size of some of the collections concerned, which number in the many hundreds of thousands or even millions. Such vast collections are not unusual amongst national museums, all of which continue to collect new acquisitions (Keene, 2008, 2005; National Museum Directors' Council, 2003).

Under-use has been reported as the regrettable norm in the museum sector (Wilkinson, 2005) and in the past has drawn trenchant criticism from cultural economists who regard it as 'hoarding': not only economically inefficient but also an irresponsible use of public funds (Frey, 1994; Grampp, 1996; Montias, 1995; O'Hare, 2005). However, museum collections cannot be regarded as stock or inventory in a conventional sense (for example, see Tersine, 1982). Museums have an ethical responsibility to maintain and preserve collections for future generations (Museums Association, 2015) and this involves a commitment to retain all artefacts, regardless of whether they are in use or not.

2.1.3 The purpose and activities of a museum: Access and preservation

A museum serves two purposes: to provide benefit to current generations of society; and also, to provide benefit in the future, to future generations. The first purpose is achieved by utilising the collection in the provision of goods and services, primarily exhibitions,

gallery displays and events. These products provide museum visitors with an experience that they benefit from. The second purpose is achieved through the preservation and development of the collection so that future generations will also benefit. This involves conservation and collection management, and also research and acquisition. The two purposes and associated activities are summarised in Table 1. A more comprehensive account of all museum activities is provided by Lewis (2004).

Museum purpose	Benefit to society	
	In the present day	In the future
Function	Access	Preservation
Activity	Collection activities ▪ Acquisition ▪ Conservation ▪ Research ▪ Documentation	
	Public service activities ▪ Interpretation ▪ Presentation ▪ Publication ▪ Communication	
Output	▪ Gallery displays ▪ Temporary exhibitions ▪ Events ▪ Publications ▪ Online resources ▪ Visitor services	▪ Conservation of the collection ▪ Development of the collection

Table 1: Museum purpose, function and activities.

A significant aspect of public service activities (Table 1) is the preparation and maintenance of gallery displays for museum visitors.[9] This includes physical preparation

[9] The public display of artefacts is only one way for a museum to deliver public benefit since museum objects can be used to support education, research and artistic creation (Keene, 2005). The outcomes have implications not only for individuals, but also for community cohesion and identity (National Museum Directors' Council, 2015). More widely, museums have been shown to have in impact on regional socio-economic development (National Museum Directors' Council, 2015, 2010; UNCTAD, 2018, 2010, 2008), and have been credited with 'soft power' that facilitates the UK's diplomatic role internationally through cultural exchange (Blond et al., 2017).

of artefacts, scholarship and interpretation in preparing accompanying didactic materials (labels, leaflets, display boards, publications), as well as the provision of numerous services that ensure that the visitor has a positive experience. Of these activities, those that concern the collection also serve the preservation function, albeit in a different form. For example, the preparation of an artefact for display (access function) may be markedly different from the conservation treatment of an artefact (preservation function), but both would need to be carried out by a conservator (Caple, 2000).

In terms of outputs (Table 1), the significant difference between the two functions is that outputs of the access function are tangible and measurable, while the outputs of the preservation function are less so. Furthermore, while the successful outcome of the access function, 'benefit to society', may be difficult to discern, the outcome of the preservation function, 'benefit to society in the future', is unknowable precisely because it lies in the future. The implication of this is that a significant amount of organisational resource is utilised for a purpose where the impact is largely intangible. For example, measuring the success of conservation work is difficult because conservation aims to ensure the long-term physical condition and stability of museum objects. Measuring material deterioration (or the lack of it) is challenging, especially when applied to the collection as a whole (Bülow et al., 2018; Waller and Michalski, 2005).

Furthermore, all of the collection activities in Table 1, acquisition, conservation, research and documentation, occur to some extent in anticipation of future use. So not only is the benefit to be realised in the future, but it is also unknown when this benefit will be realised, how this will happen, and who the beneficiary will be. These activities therefore take place on the assumption and expectation that someone, at some point, will benefit. The flip side

of this is that there may be no obvious consequences to these activities not taking place. This may therefore be a factor that contributes to the formation and persistence of backlogs of documentation work, since documentation can be endlessly deferred without an apparent impact on a museum's ability to fulfil its purpose.

2.1.4 Tensions in museum work

In a small museum the full range of tasks listed in Table 1 may be carried out by a handful of staff, each taking on multiple roles (for example see case study in Huvila, 2013); therefore the 'museum profession' includes individuals from a wide range of backgrounds, with diverse specialisms, skills and competencies (Kavanagh, 1991). However, those who work directly with the collection are more likely to have specialist skills and qualifications in particular conservators and curators, and the latter may have highly specialised academic expertise (Boylan, 2004).

In larger museums, such as the national museums, there may be hundreds of staff arranged in functional departments, thereby forming distinct groups. The groups that are involved in public service activities (Table 1) will be specifically oriented towards the access function, but those involved in collection activities will contribute to both the access and the preservation functions. Not only can there be boundaries between groups with different practice, but also the two museum functions can be in tension with each other. For example, putting artefacts on display can put them at risk of physical damage. This means that decision-making must balance the preservation of the object with the many benefits of access (Caple, 2000; Keene, 2002; Lithgow, 2011). These tensions play out in the boundary dynamics in cross-functional teams (for example, see case studies by Jefferson

and Vince-Dewerse, 2008; Lee, 2007; also, more detailed accounts of museum work by Janes, 1997; Macdonald, 2002).

However, the tension between the two functions can also be seen at strategic level in museums, for example it has been reported that in response to financial constraints the UK museum sector has, since 2010, cut back on curatorial and conservation work, indicating that public service activities have been prioritised (Ewin and Ewin, 2015; National Museum Directors' Council, 2015). Public service activities are not only more tangible and bring immediate benefit, but can also generate revenue, compared with the relatively intangible activities associated with preservation and development where the benefits are deferred (Lord and Markert, 2007).

Finally, museum work is distributed across time, particularly concerning the preservation function. There are no time limits on how long a museum will keep their collection for. Phrases like 'long term' and 'for future generations' are often used and express the general principle that museums collect and accession artefacts but tend not to dispose and deaccession. The implication is that if artefacts are to be retained indefinitely then the knowledge associated with those artefacts must also be retained and must be useable for future generations of museum staff. The representation of that knowledge in information resources, and the temporal mobility of those resources are key for the museum to continue to fulfil its purpose to bring benefit to society in the present day and in the future.

2.2 Collection knowledge

'Without a label a specimen is just dead meat'

(comment from a zoologist, Star and Griesemer, 1989, 401)

The collection is vital for museum function but cannot be managed and used without knowledge of the individual artefacts. This collection knowledge is therefore just as important as the collection itself to the extent that for some practitioners, collection knowledge, rather than the material collection, is the most important asset of a museum (Hooper-Greenhill, 1992; MacDonald and Alsford, 1991; Washburn, 1984).

On an operational level, collection knowledge – concerning the location and identity of artefacts – is essential to enable a museum to keep track of the artefacts in the collection in the same way that inventory management requires data on inputs and outputs of stock (for example, Ge and Helfert, 2008). Collection knowledge is used by all museum staff who are involved in the production of outputs, including curators, conservators, exhibition designers and education staff. Collection knowledge is not only needed to facilitate the production of museum outputs, but is it also represented in those outputs, presented in didactic displays, labels, multi-media presentations, and publications. It can also be represented as an output itself when it is made available as an online resource. This virtual access is another way in which a museum brings benefit to society (Trant, 2008; Young and Hammond, 2010).

The value of systematic, consistent recording of collection knowledge was recognised by the earliest collectors who began to catalogue their collections before the first museums were founded (Delbourgo, 2012; Hooper-Greenhill, 1992; Jones, 1988). The documentation work that is carried out in museums today is a natural extension of the cataloguing practice of early museums and private collectors (Caygill, 2012; Jones, 1988;

MacGregor, 1994). The aim of early cataloguing work was not only to establish an inventory of a collection but was also a way for scholars to understand the world around them. This involved not just naming objects but also sorting and organising them into categories, a practice that can be traced back to the 17th century (Hooper-Greenhill, 1992). This classification work was often cited as the very reason to collect, since an understanding of the world, in particular the natural world, was predicated at that time on classifying and naming things (Pearce, 1992; Simpson, 1984). The principle of systematic naming and recording of specimens from the natural world was extended to non-scientific objects such as works of art, books and manuscripts, curios and miscellanea as collections became diverse (for example, see Delbourgo, 2012).

Today, museums retain strong links with academic communities, notably in fields which rely on physical artefacts and specimens such as archaeology, anthropology, palaeontology and natural history (Keene, 2005). This connection extends to engaging in fieldwork and collecting. Some museum collections are developed specifically to support the development of scientific knowledge (Bursell, 2004), and many museums actively support research amongst staff and students, often in collaboration with academia. Research in museums is wide ranging, not just focused on studying artefacts, but also seeking to explore issues in museology and museum practice (for example see Research Strategy at Tate, 2022). The information ecology of museums therefore intersects with diverse external communities.

2.2.1 The instability of collection knowledge

Early collectors were striving for encyclopaedic truth through collecting and cataloguing; however, collection knowledge is not 'embodied' in museum artefacts waiting to be

extracted (compare with Orna and Pettitt, 1998, Figure 2.2). Instead, it is interpretive, and it is this interpretive knowledge that gives the collection meaning from which it derives its value and significance (Bearman, 2008; Pearce, 1990a). Without this knowledge, therefore, an artefact is potentially meaningless – thus a natural history specimen is merely 'dead meat' unless it is associated with knowledge of what it is and what it means (Star and Griesemer, 1989).

There are innumerable ways to 'know' an object (Bearman, 2008; Keene, 2005; Sharon Macdonald, 2006), and while museums may present the authoritative view of the artefacts in their collections, this view is not the only one.[10] Museum practitioners have long recognised that collection knowledge changes over time as new knowledge is developed and perspectives shift (Taborsky, 1990). Collection knowledge is therefore not only subjective, but it is also unstable because interpretations change as knowledge develops and different perspectives are adopted.

This is seen in the development of current moves to 'decolonize' museum records so as to neutralise the explicit Eurocentric colonial bias which can be particularly apparent in nineteenth century records of objects belonging to indigenous peoples (Turner, 2015). Thus, the interpretation of museum artefacts is not only unstable but also stems from a

[10] The construction of museum knowledge has been explored much in museum studies literature. A review of this literature is beyond the scope of this section, which instead aims to provide only a brief overview of the concepts along with some specific examples. Hooper-Greenhill (1992) presents a broad sweep of how perspectives on cultural heritage collections have changed over the centuries, while Pearce (1992) provides in-depth discussion.

particular world view, and different communities may interpret museum collections differently, with profound political implications (Crooke, 2006; Haan, 2006; Macdonald, 2006). For example, some artefacts in ethnographic collections have sacred meaning to indigenous people and this has resulted in objects being removed from museums and returned to their place of origin (see Ames, 2004; Warren, 2004, for an overview of the ethical issues).

Different meanings depend not only on world view and perspective, but also the context in which the artefact is interpreted, thus an artefact that has specific meaning that is derived from its position in the landscape will lose that association if it is removed and placed in the museum context. For example, Holme I, so called 'Seahenge', consists of the fragmentary remains of a prehistoric ritual site which was originally located on a beach but is now on display in a museum. The removal of the remains provoked considerable controversy at the time, with some arguing that they should be left to decay in the natural environment (Laverock, 1999).

The meaning of a museum artefact is also considerably dependent on the context of the museum collection since each collection is a unique assemblage with a stated aim and remit. For example, a horse can be an anonymous specimen in a natural history collection but can also be a named individual with specific associations, such as Marengo, the horse of Napoleon Bonaparte, whose remains are exhibited as part of a display about the Battle of Waterloo (National Army Museum, 2020). The meaning of an artefact will therefore vary between museums since each museum collection is unique and no two objects are the same (Marty et al., 2003; Pearce, 1992).

Just as there is endless scope for diverse interpretations of an artefact, there is no limit to what can be known about an artefact. Therefore, the development of collection knowledge is entirely open-ended (Orna and Pettitt, 1998). Also, despite the changeable and ever-expanding nature of collection knowledge it must be managed with a view to permanent retention. This is because just as the collection is expected to endure, so the knowledge of the collection must endure too so that knowledge of the artefact in the collection is retained. Hence, a museum should aim to maintain a permanent record of its collection, as stated in the guidance notes for museum accreditation (Arts Council England, 2019).

2.2.2 The management of collection knowledge

The instability of collection knowledge has implications for answering the question: 'what is it?', which is central to the identification of the artefact, and therefore central to the care and use of that artefact. While identification can be achieved through barcodes this facilitates physical access but not intellectual access. Interpretive collection knowledge needs to be managed so that the museum can address questions about not only the identification of an artefact, but also what it means. This enables the artefact to be used to fulfil museum purpose. To return to the quote from Star and Griesemer, an artefact or specimen must be labelled so as to be identifiable, and this label must enable the user to refer to records that represent what is known about the item. The challenge is to manage collection knowledge so that it is systematically represented in a way that is readily accessible to users of the collection.

Numerous groups in a museum work directly with the artefacts in the collection, and they develop their own understanding of the objects from their interactions with them. This is retained locally in an individual's dispositional knowledge (Brown and Duguid, 1998) or

in departmental records. For example, a collection manager may arrange artefacts so that they fit safely into a storage cabinet. This may mean that the artefacts are not arranged in numerical order, and the rationale behind this resides primarily in their personal knowledge. At a departmental level, conservators retain records documenting the conservation treatments they carry out on artefacts, or surveys conducted to assess the condition of artefacts in storage (Keene, 2002; Michalski, 2004; Pye, 2001). A considerable amount of knowledge is represented in the corresponding information resources that are created in the course of museum activities.

However, the main source of knowledge regarding the identification and meaning of artefacts resides with curatorial staff, the experts responsible for the 'musealisation' of artefacts (van Mensch, 1990) whereby objects are selected to be designated as heritage. The consequence of the instability of collection knowledge is that multiple ways of knowing an artefact extends to multiple representations of this knowing. In the past, curators have carried out cataloguing work in the way that they see fit, and subsequent generations of curators have introduced their own preferred methods and systems. Museums have had to contend with the legacy of numerous different approaches to numbering and recording, even within the same curatorial department. For example, the Department of Ethnography at the British Museum was reported to have had over 60 different numbering systems (McCutcheon, 1986).

Furthermore, curatorial discretion extends to what artefacts to catalogue and when, so not only can recording be carried out inconsistently, but also the resulting record may be incomplete. The problem of patchy cataloguing practice is not a new phenomenon. Records from the 17th century reflect frustration amongst the committee of the Royal Society at the

standards of cataloguing. This was an apparent contributory factor in the loss of an early experimental telescope constructed by Sir Isaac Newton and donated by him to the Royal Society collection in 1671 (Hall and Simpson, 1996; Simpson, 1984). Over 150 years later, a parliamentary inquiry investigated the collection management practices at the British Museum in great detail and reported grave concerns over standards of cataloguing and indexing (Select Committee on the British Museum, 1835). Later still, indexing of collections was one of the primary concerns of the Museums Association when it was founded in 1889 (Roberts and Light, 1986).

By the 1970s, there was sufficient impetus in the UK museum sector to address the legacy of past practice. This was supported through a network of regional museum 'councils' that provided consistent guidance to local museums, along with funding from the Museum and Galleries Commission. Early initiatives to develop data standards and standardised procedures were originally geared towards the creation of a national index of museum collections. However, it became clear that the over-riding concern of non-national museums was care and access to their collections. This, together with a growing interest in the use of computers for data management, led to the formation of the Museum Documentation Association (MDA) in 1977.

The MDA (which later became Collections Trust) was able to provide continuity of advice on documentation, setting standards and developing resources for use across the museum sector (ibid). This led to the development of the Spectrum museum documentation standard which was first published by MDA in 1994 and is now on its fifth edition (Gosling and

McKenna, 2017; Grant and Museum Documentation Association, 1994).[11] Today, there are nine 'primary procedures' in the Spectrum standard that museums must have in place in order to meet with criteria for museum accreditation (Arts Council England, 2018a).

2.3 Museum documentation

The processes of museum documentation ensure that collection knowledge is represented, but these processes also have significant administrative and operational functions (Harrison and McKenna, 2008).[12] On an operational level, the creation and maintenance of museum documentation means that the information can be made available to all those who are concerned with the management and care of the collection. This is significant due to the vast scale of many museum collections, the needs for multiple users across the organisation to have access to collection information, and the need to retain the collection, and collection knowledge, indefinitely (Orna and Pettitt, 1998). The wider implications are that a museum cannot fulfil its purpose to provide benefit to the public without knowing what is in its collection and where those artefacts are. The neglect of documentation is therefore considered to be unethical (International Council of Museums, 2017).

Museum documentation is also needed to prove legal ownership of the artefacts, especially for purposes of audit or in the event of theft (Stone, 1992). It therefore helps to ensure the

[11] Spectrum 5.0 was published in 2017 after the end of my fieldwork but was consulted during my data analysis and interpretation. Both Spectrum 5.0 (Gosling and McKenna, 2017) and version 4.0 (Dawson and Hillhouse, 2011) are cited in this thesis.

[12] I have used terminology from the practitioner literature of the UK museums sector, but this may differ from terms used elsewhere. For example, in the US 'documentation' usually refers to the process of cataloguing while accessioning is referred to as 'registration' (Buck and Gilmore, 1998).

security of the objects. For new acquisitions it is important to establish legitimate provenance so that museums do not acquire objects that have been stolen or looted. This is governed by an international convention on illicit trade of cultural property (UNESCO, 1972). In the UK, additional legislation applies to specific materials in museum collections such as human remains (Gerstenblith, 2006). Failure to maintain adequate records of museum collections is therefore not only considered unethical but can also raise the risk of prosecution.

2.3.1 Documentation processes

The parliamentary inquiry into British Museum management described two key elements of documentation: new acquisitions were listed in large leather-bound books, a process referred to as registration; and at a later date, they were catalogued by the curators (Select Committee on the British Museum, 1835). This separation of administrative and interpretive aspects is seen today in the Spectrum standard where the recording of new acquisitions, the primary procedure of 'accessioning', is a separate procedure from cataloguing (Gosling and McKenna, 2017).[13] The accession record can be a completely separate record from the catalogue, and while the cataloguing process is typically an interpretive, curatorial task, accessioning is more administrative and therefore can be non-curatorial. The two processes are described briefly.

[13] Spectrum sets out nine primary procedures that need to be in place for a museum to achieve accreditation: object entry; acquisition and accessioning; location and movement control; inventory; cataloguing; object exit; loans in (borrowing objects); loans out (lending objects); documentation planning (Gosling and McKenna, 2017)

2.3.1.1 Accessioning: An administrative process

The process of accessioning is important because it includes the administration of transfer of title whereby ownership of the artefact is legally transferred (Gosling and McKenna, 2017; Roberts, 2004). Once an artefact has been accessioned it becomes part of the permanent collection and the museum has legal responsibility for it. This also means that objects that have not been accessioned are not officially part of the collection even if they are physically stored at the museum and have been legally acquired. The accession record functions as a basic inventory list, and its legal significance means that accession records need to be secure and permanent. Current guidance therefore recommends the use of archival quality registers or computer records printed on archival quality paper and bound into volumes, and stored in a secure, fireproof location (CIDOC Documentation Standards Working Group, 2012; Harrison and McKenna, 2008).

Apart from establishing and documenting the legal status of the artefact, accessioning also involves assigning a unique identifier, the accession number. This is key to the on-going identification of the artefact and the identification of associated written records (Holm, 1998). The format of the numbering system used for accession numbers is devised by the museum and can be a simple numerical sequence or can incorporate other signifiers such as year of acquisition. Since this numbering takes place at the time of acquisition, the numerical sequence of accession numbers usually indicates the sequence of acquisition (ibid).

The accession number needs to be physically associated with the artefact. This can be achieved by writing the number directly onto the object or on a label attached to the object. However, maintaining the physical association between the object and its number can be

difficult when the artefact is extremely small or fragile (Waller and Cato, 2017), for example, an insect specimen, jewellery, or archaeological fragments.

When an accession number has been assigned to the artefact, its number is entered into the written accession record along with a record of its storage location and usually associated information regarding its acquisition. However, there needs to be further descriptive information in order for the artefact to be readily identifiable. This information typically includes a name such as ‘chair’ or ‘spoon’, and possibly a text description of its physical appearance. The record may also include information obtained through direct observation of the artefact such as weight, dimensions and a visual representation (line drawing or photo) (Harrison and McKenna, 2008).

2.3.1.2 Cataloguing: An interpretive process

The bare minimum that a museum needs to ‘know’ about its collection is the number, object name and location of each object. However, additional descriptive information about an artefact, its history, associations, and any other contextual information such as outcomes of research is needed to inform the future use of the artefact. This is recorded through the process of cataloguing.

The accessioning process is described here as administrative since it involves minimal interpretation and discretionary decision-making. Accessioning is also more likely to be carried out centrally so as to maintain a single system of accession numbers for the whole collection. This reduces the risk of duplication, which is a significant consideration since the accession number is intended to be a unique identifier. In contrast, cataloguing is described as interpretive since it involves the application of specialist curatorial

knowledge, and Collections Trust guidance advises that cataloguing is best carried out by subject specialists (Harrison and McKenna, 2008).

In the suggested cataloguing procedure in Spectrum, the minimum requirement for a documentation record (referred to as 'core inventory information') consists of seven types of information: number; name; number of items (if a group); description (or image); storage location; owner (if not the museum); and a note of who recorded the information and when (Gosling and McKenna, 2017). The cataloguing procedure consists of adding 'other important information', which consists of:

- Identification (6 fields) e.g. number, name
- Description (32 fields) e.g. age, content, material, style
- History and associated information (13 fields) e.g. date, associated person, place or other artefact
- Field collection (9 fields) e.g. collection date, place, method
- Production (7 fields) e.g. date or place of production, reason for production
- Owner's contribution (4 fields) e.g. owner's personal experience
- References (12 fields) e.g. publication details of any citations
- Amendment history (6 fields) e.g. audit information

According to the Spectrum guidance, different types of information will be recorded for different types of artefacts, so of the 89 possible fields, the cataloguer should 'record as many as you need' (Gosling and McKenna, 2017). So, while some of these fields involve collating information from other sources, such as acquisition records and publications, discretion is needed to decide what to record and to what extent.

The main aspect of cataloguing that requires curatorial expertise and discretion is the detailed recording of the description of the artefact and associated information: not just physical appearance, but also possibly how it was made, why and by whom; possible associations with a particular person or place or event; and information about when, where and how the artefact was collected, for example, a particular habitat for natural history specimens, or a stratigraphy for geological, paleontological or archaeological artefacts. Much of this additional information requires significant understanding of the cultural context of the artefact, and application of that understanding to determine the significance of the artefact and therefore what pieces of information 'need' to be recorded.

In practice, the processes of accessioning and cataloguing are not necessarily easily separated. Accessioning is often carried out by curators because the acquisition of new objects is a curatorial activity and, as already noted, in smaller museums individual roles have multiple functions so a curator may carry out administrative processes. Additionally, while the Spectrum standard implies that accession and cataloguing records are separate, if a CMS is used, they can be integrated so that there is one entry per artefact.

2.3.2 Standardisation

The development of resources such as record cards, forms and registers by MDA, and subsequent distribution to UK museums, was driven in part by the demand from museums for advice and guidance, and the need to raise standards of documentation (Roberts and Light, 1986). The need for support was highlighted by survey research that examined the poor state of documentation records in museums (Holm, 1993; Prince and Higgins-McLoughlin, 1987; Roberts, 1986). More recently, the inclusion of the Spectrum primary

procedures into the Museum Accreditation Standard has ensured that a consistent approach to documentation is being applied widely in the UK museums sector.

However, while the Spectrum standard has established common principles for museum documentation, the precise way that artefacts are catalogued is more difficult to standardise because different types of artefacts have specific requirements. This affects the types of information that are considered necessary, for example when recording geological specimens, information on complex, rock, age and zone may be required (Orna and Pettitt, 1998, Figure 8.1). Different artefacts also require different overall approaches to cataloguing. For example, natural history collections may be catalogued using Linnaeus' taxonomy, while art collections may be catalogued by artist, artistic period and genre (see chapters in Dudley and Wilkinson, 1979; Reibel, 1997). This means that different museums may approach cataloguing differently depending on the type of collection, but also an individual museum with a diverse collection may end up with many different documentation systems in place. For example, the collection of the Imperial War Museum in London includes artworks, medals, firearms and sound recordings, and until the 1980s did not have a museum-wide standard procedure for documentation (Smither, 1986).

These differences concern classification, which in turns affects sequence, grouping and also naming. These are all interpretive acts, so not only does cataloguing differ for different types of artefacts but also all the contextual factors previously mentioned may also affect the way an artefact is catalogued (Marty, 2008; Peacock, 2008). For example, Marengo, Napoleon's horse cited earlier, could be grouped with animal remains in the collection, or with artefacts associated with the Battle of Waterloo, or with items that had belonged to Napoleon. All would be valid and would affect the way that the remains were catalogued.

Decisions can be more intricate, for example at the Imperial War Museum, when recording the nationality of weaponry or equipment, the cataloguer must decide whether to record the country of design, manufacture, purchase, first use, or last use (Smither, 1986). Each may produce a different result, and each represents a difference in the rationale behind the value and significance of artefact.

This is in stark contrast with the classification systems used in libraries. The publications in a library are representations of knowledge, and that knowledge can be identified and categorised. Library publications can then be sorted by category. Library classification systems such as the Dewey Decimal System aim to cover the entire scope of human knowledge so that any publication can be allocated a location in a class and subclass (Chan and Salaba, 2016). Furthermore, a library object typically has attributes such as a title and a named author that museum artefacts lack. As previously discussed, museum documentation aims to address the question 'what is it?' to which the answer can be subjective, highly variable and contested. These fundamental differences between library and museum objects mean that museum classification is challenging in a way that library classification is not (Bearman, 2008).[14]

[14] Gilliland-Swetland (2000, Figure 1) provides a cross-domain comparison of libraries, museums and archives that shows the extent of the similarities regarding the preservation of cultural heritage and benefit to society. However, the main distinctions are that the aim of a library is to provide access to the world's published knowledge; a museum's role centres around the value, meaning and significance of material culture; while archives have a role in ensuring accountability of governments and non-governmental organisations through documentary materials.

As well as differences in approaches to cataloguing, the terminology and syntax used can vary greatly. Museums have traditionally shied away from terminology control that ensures that a single term is used consistently and unambiguously to refer to a single entity (Orna and Pettitt, 1998). While 'authority control' has become standard practice in libraries, museums have traditionally maintained the subjective nature of terminology that reflects diverse individual perspectives and linguistic developments over time (Bearman, 2008). So, while Spectrum recognises the need for consistent terminology, there is still no single agreed system in the UK. At international level, the advice remains that a museum should be internally consistent in its use of terminology and syntax without prescribing which words to use (Roberts, 2004).

As Bowker concludes in his study of biodiversity information infrastructure, failure to standardise names reflects the inherent nature of the discipline, rather than a failure to reach consensus (Bowker, 2000b). Rather than striving for universal standards, Bowker advocates developing forms of integration that maintain diversity of local practice. Collections Trust has made progress in this area by assembling relevant thesauri as an online resource for practitioners (Collections Trust, 2019). This includes thesauri developed by individual museums such as the British Museum (see case studies at the RAF museum and the V&A museum in Orna and Pettitt, 1998; also, Young and Hammond, 2010). Data standards have also been developed, such as the Appendix to Spectrum on information requirements (Gosling and McKenna, 2017; see also Baca et al., 2006). These list and define the types of information for museum documentation without specifying actual terminology, bringing consistency to what is being recorded.

Lack of consistent terminology has an impact on the accessibility of museum information and thereby access to the collection (Peacock, 2008, for example see National Maritime Museum case study in Orna and Pettitt, 1998), and when computers were introduced and work began to integrate existing documentation records, the consequences of lack of standardisation became painfully clear as museums struggled with legacy data (Roberts and Light, 1986; see case study by Turner, 2016).

Interest in the use of computers for managing documentation in museums grew in the 1960s and 1970s, along with a growing recognition of the need for standardised recording (Jones, 2008; Marty et al., 2003; Orna and Pettitt, 1998). By the mid-1980s, a number of factors combined to increase the pressure and also the appetite for computers in museums in the UK. Computerisation was a way to address 'scandalous' standards of documentation (Roberts, 1986, vi) while addressing calls for a more strategic approach to management, part of overall increased managerialism in the public sector (Audit Commission, 1991; Ferri and Zan, 2015; Hood, 1991; Kawashima, 1999) Computerisation would improve inventory control by bringing together and standardising the information that was dispersed across the organisation and thereby improve accountability (Wentz, 1989). Bespoke software could be used to manage collection knowledge and manage inventory (Abell-Seddon, 1989; Kamisher, 1989). However, not only was the scale of the task daunting (Schmiegel, 1989), and characterised by initial resistance to the novel technology (Doty, 1990; Rush and Chenhall, 1979; Stam, 1992) but also there was sometimes a lack of understanding between information system designers and curatorial staff (see Hampshire Museums Service case study, Orna and Pettitt, 1998).

Despite the challenges, the computerisation of documentation records has meant that information about the collection is more widely available, and presented in a flexible format that enhances retrieval and use (Orna and Pettitt 1998; Roberts 2004). A CMS is not just a repository of information that identifies and describes the artefacts but can also record their location and use. This functionality means that a museum can carry out most of the nine Spectrum primary procedures with one system, and although the Collections Trust does not issue Spectrum as a software package, they have multiple 'Spectrum Partners' whose collection management systems are validated by Collections Trust as compliant with the Spectrum standard (Collections Trust, 2022b).

Many of the Spectrum procedures concern location and movement, such as the entry and exit of artefacts, the loaning of artefacts and receipt of loaned artefacts. Spectrum has gone from being the UK documentation standard to being the UK collection management standard, a reflection of its wider remit in the care of museum collections, and also a reflection on how Collections Trust view Spectrum: not just about representing curatorial knowledge, but about the welfare and use of collections. This is achieved through managing information.

2.3.3 Documentation systems as information infrastructure

Museum documentation systems record the knowledge associated with the artefacts in the collection, and for accession records there is a legal imperative for this documentation to be retained indefinitely (Gosling and McKenna, 2017). However, for all museum documentation there is a strong case for indefinite retention so that the museum can deliver benefit now and in the future. This means that museum documentation needs to be created with temporal mobility in mind. The design, maintenance and use of documentation

systems must therefore balance the short-term needs of users with anticipated long-term requirements.

These short- and long-term considerations are characteristic of information infrastructure as defined in the STS literature, and what Karasti et al refer to as 'infrastructure time' (2010). For example, scientific communities that research biodiversity strive to build databases that match the lifetime of an ecosystem, rather than merely the 30-year career lifespan of a researcher (Baker and Bowker, 2007). The environmental science and cultural heritage fields share a concern with the preservation of resources (natural and cultural) for the future benefit of all, and this extends to the maintenance and preservation of information resources.

However, methods of data collection, representation and management are not consistent over time: 'when data collectors retire, typically their protocols are not sufficiently well enumerated for future generations to use the data' (Baker and Bowker, 2007, 129). This presents challenges for subsequent use, and for integration with information systems, as has been the case for the computerisation of museum documentation records.

The integration of information resources from diverse groups requires standardisation, an essential element for ensuring the mobility and interpretive flexibility of the content in an information infrastructure (Star and Bowker, 2010). Standardisation facilitates the reuse of information content by a wide range of users, but also the resulting information resource is more predictable and stable, and this reduces the cognitive load for users (Turner et al., 2006). However, as seen in museum terminology, integration has its limits, so the terminology of one museum is not necessarily fit for all. Bowker has explored similar

classification issues in biodiversity, where naming can be contested and political, while some apparently tangible entities such as soil defy definition altogether (Bowker, 2000a).

Information infrastructure is only one layer of an information ecology that incorporates the groups that collect data and information content, the communities that process and integrate that content, and the global systems that distribute it (Baker and Bowker, 2007). So, an individual information system is one part of a network of networks. This interconnectedness has implications for design because the design and construction of one element will have an effect on others. This includes consideration of socio-technical aspects that the field of information systems tends to ignore (Karasti et al., 2010; Pipek and Wulf, 2009).

In practice, for the design of information systems to consider all elements of information ecology, the approach should be iterative and incremental, and should include users (Hanseth and Lundberg, 2001). The development of an infrastructure system therefore involves boundary spanning work (Doolin and McLeod, 2012; Sonnenwald, 1995). This iterative approach is seen in the development of the Spectrum standard, a key element of museum information ecology. The creation of Spectrum originally involved input from over 100 museum practitioners (Harrison and McKenna, 2008) and it is continuously being developed. A revised version, Spectrum 5.1 was published in 2022, five years after the publication of Spectrum 5.0 (Collections Trust, 2022a).

Interconnectedness also means that an information infrastructure and the wider information ecology does not have well defined boundaries. Infrastructural elements overlap and are embedded in practice (Star and Bowker, 2010; Star and Ruhleder, 1996). At a museum,

the collection itself is part of the information infrastructure (Huvila, 2013). The extent of this embeddedness and connectivity can mean that infrastructure is invisible (Edwards et al., 2009; Pipek and Wulf, 2009). This in turn means that it is taken for granted, as is the infrastructuring work that takes place to setup and manage the information systems. When breakdowns occur, it may be difficult for users to articulate their needs, and difficult to locate the source of the problem (Pipek and Wulf, 2009).

The infrastructuring role of the information manager is vital for ensuring the smooth flow of information in the ecological model. They 'make it all work together' (Baker and Bowker, 2007, 139). This is a boundary spanning role, and in museums, the need for this capability emerged out of the pressing need for mediation between the curatorial and technological perspectives at the time when computers were being first introduced. Now that documentation practice is defined by the Spectrum standard and explicitly linked to Museum Accreditation, the approach to documentation processes is defined, formalised, and benchmarked. There are now documentation specialists in museums who are familiar with documentation standards, the underlying principles, and the processes for achieving the standard. They collaborate with and translate for multiple groups at the museum, while applying their expert knowledge of documentation best practice (Orna and Pettitt, 1998).

Invisibility is not necessarily a drawback. Infrastructure becomes visible when it becomes effortful in use, at times of breakdown, at other times it remains hidden in the background (Pipek and Wulf, 2009). However, when work is invisible then the dynamics of an information system and the interconnected infrastructure can be difficult to discern, regardless of changes or contingencies and their impact (Star and Strauss, 1999). In order to investigate a particular phenomenon concerning an information infrastructure, it is

necessary to pay attention to the invisible aspects, in particular the work of infrastructuring. In the case of museum documentation, and the phenomenon of backlogs of documentation work, my investigation focused on the work of a documentation specialist at a museum as we carried out documentation work together.

2.4 Chapter summary

The information ecology of a museum consists of the groups that generate and represent knowledge, the communities that integrate knowledge and information, and all the infrastructure and information resources that support the activities of the overall ecology. The museum also interacts with external groups that collaborate with the museum in the acquisition of artefacts and development of knowledge about the artefacts. The collection is central to the fulfilment of museum purpose and so the preservation of the collection, knowledge of the collection, and representations of that knowledge is a core museum function. Preservation supports the second core function, that of access. However, the preservation function aims to deliver future benefits which are anticipated but unknowable, and therefore intangible.

Knowledge of the artefacts in the collection is dynamic and diverse, which is problematic when representations of that knowledge are required for museum operations. However, in an effort to establish a consistent approach to museum documentation in the UK, the museum community developed the Spectrum standard, which is now incorporated into the Museums Accreditation standard. This sets out basic procedures that museums should have in place to appropriately care for their collections through information management. However, although the standard includes a list of types of information to record, it stops short of specifying terminology.

There is much scope for interpretation in the application of Spectrum. Museum documentation involves administrative and interpretive elements that are both required to consistently identify artefacts. The challenge is to integrate representations of curatorial knowledge into a structure that can be used for collection management. This requires museum documentation work: infrastructuring work that happens in the background, but becomes visible when breakdowns and blockages, such as documentation backlogs, occur. This study aims to investigate this invisible work to provide an insight into some of the difficulties of the documentation task and thereby one of the factors affecting the formation and persistence of documentation backlogs.

3 Routines as an analytical perspective: Setting and method

During fieldwork, my role was one of active participation or 'participant-as-observer' (Gold, 1958, 220; see also Baker, 2006) which involved taking part in the documentation activities and being involved while overtly retaining my researcher identity.[15] The decision to enter the field was partly serendipitous – Museum A had invited me to participate in some documentation work so that I could see first-hand what it involved. However, there were also considerable advantages to participating in the task as a researcher, and taking advantage of this opportunity was entirely in keeping with my flexible approach to data collection and the exploratory nature of my initial research question concerning documentation backlogs (Section 1.3).

This chapter begins with a methodological discussion of my approach, followed by an introduction to the research setting, Museum A, and description of the fieldwork conditions and method of data collection. When analysing my data, I used routines as an analytical perspective. After a brief introduction to the routines literature and my methods of analysis, I describe the documentation routine, my analysis of that routine and how this led to my focus on context.

3.1 Methodology: participant observation and autoethnography

Participant observation, a form of ethnography where the researcher is not only immersed in the setting but actively participates in it, is particularly suited to exploratory research

[15] This is distinct from complete participation where the researcher is completely and covertly immersed in the field (Gold, 1958).

questions because of the extent to which the researcher engages with the setting under investigation (Jorgensen, 1989). This method has been used as a way to gain insight into organisational processes, so as to understand 'how things work' (Van Maanen, 2011, 218). The researcher's deep engagement with the research setting gives the opportunity to generate 'thick description' of actual work activities (Bechky, 2006), the argument being that 'work is different from what management says it is' (Orr, 2006, 1806). Furthermore, participation enables the researcher to observe work that is hidden not because it is suppressed (Vinten, 1994) but because it is otherwise invisible or taken for granted (Star and Strauss, 1999; Suchman, 1995), such as the work of technicians (Barley and Bechky, 1994). Such work may be not only under-reported but also possibly misunderstood and underappreciated, and not happening in the organisationally prescribed way (Jorgensen, 1989; Locke, 2001).

Where tasks are repetitive actions, they can be viewed as routines – the analytic perspective that I used to understand documentation (discussed from Section 3.6). Routines can be particularly challenging to study and analyse because routine work resides partly in 'organisational unconscious' (Cohen and Bacdayan, 1994, 556), and routines are considered to be stores of tacit, unarticulated knowledge (Becker, 2004). These activities are not only hidden by dint of occurring in the background behind more conspicuous activities such as decision-making but are also only partially acknowledged by those that carry them out. As Cohen and Bacdayan put it: 'they simply cannot put into words what they do and why' (Cohen and Bacdayan, 1994, 556). This is echoed in the words of a research participant: 'I just do it, I don't think about it' (Cooper et al., 2004, 7). This means that recurrent patterns of work can be particularly difficult to study when relying on the reporting of participants.

Participant observation in a naturalistic setting enables the researcher to establish the context of events as well as explore those events through deeper engagement than would be possible through non-participatory observation (Park, 1994; Vinten, 1994). However, there are different levels of participation and membership reflecting the extent to which the researcher retains their overt, outsider status and identity (Baker, 2006; DeWalt and DeWalt, 2011), and as Watson points out, ethnographic researchers are not truly revealing participants' 'lived experiences' (Watson, 2011) because their findings are always seen through the subjective lens of the researcher's observations.

In my participant observation of museum documentation, my personal experience of the documentation task was key to gaining an insight into the task and what it involved. This included not only the sequence of actions in performing the task, but my experience of how problematic the task was, how problems were resolved, and my experience of difficulty. According to DeWalt and DeWalt, participation not only enhances the quality of the resulting data, but also the use of recollections of personal experience enhances analysis of the data (DeWalt and DeWalt, 2010). This was certainly the case with my data analysis (see Section 3.6), where my experiences of the documentation task were an essential component in understanding the causes of difficulty. This autobiographical approach to data collection and analysis can be seen as 'autoethnographic'.

Autoethnography focuses exclusively on the researcher's personal experiences, resulting in a more authentic account of the research setting (Doloriert and Sambrook, 2012). In 'evocative' autoethnography, the autobiographical approach is typically intensely personal, often emotionally rich and heartfelt (Boyle and Parry, 2007; Doloriert and Sambrook, 2012; Sambrook and Herrmann, 2018). Autoethnographic accounts may take

unconventional forms such as poetry or stream of consciousness unstructured narratives (Boyle and Parry, 2007).

However, autoethnography can also take an analytic form where the autobiographical account is the basis for conceptual development and theoretical discovery (Anderson, 2006; Snow et al., 2003). In analytical autoethnography, the approach I have taken in my fieldwork and analysis, the researcher is deeply embedded, as in all ethnographic studies; but is prominent in the resulting text. This prominence necessitates reflexivity by the researcher, showing awareness of their status in the research setting and their effects on it. Finally, the researcher is not purely engaged in autobiography but engages beyond the self, with participants or with other data, while retaining their 'commitment to an analytic agenda' (Anderson, 2006, 386) rather than, for example, aiming for a purely descriptive account. By adopting an analytic autoethnographic approach, I aim to provide a compelling and authentic account of the museum documentation task, while linking my findings to theory.

3.2 Background to fieldwork

My participatory fieldwork was motivated by my need to experience museum documentation first hand, with the aim, in the first instance, to confirm that it was in some way taxing and challenging, and secondly to analyse the factors that caused any difficulties. Museum A was one of several museums that had granted access for me to interview museum practitioners about documentation backlogs during an exploratory phase of my research. In total, I carried out 24 semi-structured interviews at eight museums. Of these, Museum A was the largest museum with the most diverse collection, and several curatorial departments. I conducted interviews in most of the curatorial departments at Museum A,

and at the end of one of these interviews I was invited to participate in some documentation work. I consequently worked with the Documentation Officer (DO) in that department for one day a week over a nine-month period.

By the time I started my participatory fieldwork I had already identified many possible factors that could potentially influence the formation and persistence of museum documentation backlogs, including the high status and autonomy of curators, and the apparent lack of consequences from incomplete documentation records, which may contribute to it not being seen as an organisational priority. However, the documentation task itself was a recurrent theme: if the task was difficult and time-consuming then the rate of acquisition may outstrip the rate of documentation resulting in a backlog of documentation work. The task may also be resource-intensive: several interviewees had lamented the lack of resources for documentation, implying that if only there was enough money the backlog could be tackled.

If documentation work was especially taxing or boring then this would act as a deterrent for curatorial staff, particularly if there were more pressing, enjoyable or interesting tasks to engage with. On the other hand, if the task was found to be particularly challenging and resource-intensive then this could be a counter-argument to the idea that curatorial staff chose not to carry out documentation work purely out of self-interest. Participating in some documentation work was an opportunity for me to gain an intimate insight into the task, its difficulties, and possible causes of those difficulties.

During fieldwork, my first impressions were that the task was straightforward, but I quickly learned to appreciate its intricacies. There were multiple sets of records that needed

to be cross-referenced, the artefacts themselves were often very similar in type, size, and shape, and the creation of a single entry on the documentation information system, required us to input a dozen or more types of information. The documentation task and its difficulties became the focus of my research, and my data gathering evolved to hone in on what we did, the materials that we used, and our experience of completing the task. Post-fieldwork, the analysis of my findings centred on reconstructing each instance of the documentation task, using the routines perspective as the conceptual framework. Later, understanding the documentation task as a routine also contributed to my interpretation of this analysis.

3.3 The research setting: Museum A

The main museum building was in the centre of a major UK city and housed extensive galleries and office space. My time was split between the curatorial department at this main site, and the two off site storage facilities. The Museum was very popular and had an extensive program of temporary exhibitions and events in order to engage the public. In addition, the Museum had a long track record of conducting and supporting research that involved the collection. This was carried out by curators at the museum, but also involved engaging with the external academic community on collaborative research and publication projects. Museum A also made the collection available (by appointment) to visiting researchers who required access to the artefacts for their studies.

The Museum A collection encompassed artefacts from all world cultures and eras, including archaeological material from the full span of UK history going back to prehistoric times. The curators tended to be subject specialists, experts in particular areas covered by the collection. Curators were supported by collection staff who were

responsible for managing the store rooms and galleries. These 'collection managers' worked closely with curators to pack and transport objects as necessary and monitor conditions in which objects were stored or displayed. They were usually assigned to work with a particular curatorial department, although they could be deployed elsewhere if needed. The third main group that was involved with caring for the collection was the Conservation Department. The conservators were specially trained and qualified to carry out treatments in conservation and restoration, for example in order to prepare artefacts for display or repair damage and deterioration.

In addition, there was a department for exhibitions and loans, which was responsible for organising special temporary exhibitions, or arranging the loan of artefacts to other museums on request. However, these activities invariably involved input from curatorial, collection management and conservation teams. Similarly, the department for interpretation and education would consider how to utilise artefacts or displays in their events or programmes, but would involve curators, collection managers and conservators as necessary. The involvement of these different groups in caring for the collection was typical of a museum of this size as it ensured that there was relevant in-house expertise. However, at Museum A, ultimate responsibility for the collection resided with the curatorial departments.

Unlike other collection-related functions, there was no department responsible for museum documentation. There was a small Documentation Team with oversight of the CMS (collection management system), the IS that was used across the museum to track museum

artefacts and manage the associated knowledge.[16] The main users of the CMS were those who worked directly with the museum collection: those from the curatorial, collection management and conservation departments. However, departments involved in exhibitions and education also used it.

Any member of staff could request access to the CMS but only those who had received training from the Documentation Team would have permission to edit the records and create new entries. As well as delivering training, the Documentation Team issued guidance for the use and editing of the content, and monitored new entries, carrying out spot checks to see that guidelines were being followed. However, responsibility for the creation of CMS entries rested with the curatorial departments, and the Documentation Team had no specific authority to enforce their guidance. New CMS entries were typically created by curatorial departments to record newly accessioning artefacts.

Overall, the organisational structure suggested that responsibility for different aspects of collection care (such as storage, transport, conservation) were devolved to different departments. However, in practice, responsibility for the collection resided with the curatorial departments, with individual curators being proprietorial over 'their' part of the collection where their expertise lay and which they were most familiar with.

[16] At the time of my fieldwork the Documentation Team was in the midst of preparing to install a new version of the CMS software. This meant that they were exceptionally busy for an extended period of time and could not accommodate my requests for interviews or observation.

The curatorial department where I was based for my participatory fieldwork was of particular interest because of the scale of their documentation backlog, which consisted entirely of archaeological material. This material had been acquired in bulk, mostly in the 1980s, and while the department had records of these acquisitions, these were departmental records and the finds themselves remained unaccessioned, so lacked museum numbers and there was no record of them on the CMS. This unaccessioned material was grouped according to archaeological excavation, and I quickly realised that the finds were meticulously documented, often with thousands of pottery fragments individually numbered with unique identifiers, all carefully bagged, arranged and stored in boxes.

As well as the bagged and labelled finds, each archaeological excavation was documented in boxes of files, binders and notebooks, maps and plans. Accessioning the backlog of finds would require the associated documentation in the excavation records to be entered onto the CMS, and this would involve locating the relevant information and converting it to fit into the CMS structure, thus requiring a translation and integration effort of tremendous scale.

At first, I speculated that the scale of this task could be the reason for deferring the accessioning of this archaeological material. However, it was explained to me that the policy at Museum A was to accession archaeological finds only after the findings from the excavation had been published. The accession record would then be based on the published catalogue of finds. This was beneficial for the future use of the finds because the published catalogue was typically the first port of call for researchers to access information about the excavation and the finds. Having the museum system reflect the catalogue made it easier

for researchers to browse, a significant advantage when finds were grouped according to material, type, or excavation context.

Each curatorial department had one named individual who had responsibility for documentation. This person typically had a particular interest in museum documentation or experience in databases and would take the lead on any new CMS initiatives such as new guidance or representing the department at committee meetings. The documentation representative was typically a curator who took on the responsibility in addition to their curatorial activities. The department where I was based for my fieldwork at Museum A was unusual in that there was an individual (the DO) whose full time role was dedicated to documentation issues. My fieldwork involved shadowing her as she responded to queries, carried out day-to-day activities, and worked on specific projects which I participated in, such as the accessioning work that is the focus of this study.

3.3.1 Fieldwork arrangements

My participation in documentation activities was welcomed by the DO and her immediate colleagues. While working at Museum A, I was open about my research and the nature of that research, but my status was primarily that of volunteer. The department was regularly assisted by volunteers, who, under close supervision of museum staff, were an invaluable part of the workforce. Volunteering is commonplace in the cultural heritage sector as it is a way for a museum to engage with local communities while benefiting from the volunteer's time and willingness to work (National Museum Directors' Council, 2015). As a volunteer, I was able to fit into a well-defined role at Museum A, since volunteers were so common that the museum had developed policies and procedures for the use of

volunteers. This also meant that it was easy to explain my presence when encountering other staff during fieldwork.

In retrospect, it was apparent that the curatorial department was actively seeking volunteers to assist with documentation work. During my time at Museum A, the DO worked with at least three other volunteers, each working on a different day of the week, and all of whom assisted with documentation work. From her perspective I was an ideal volunteer as I had previous experience of working with archaeological artefacts, including formal training, and had an obvious interest in documentation work.[17]

By the time I started volunteering for the DO, I had already conducted fieldwork at Museum A over several months, mainly interviews during the exploratory phase of my research. This meant that I already had security clearance and could start work almost immediately. The initial agreement was to work for one day a week on an open-ended basis. This was reviewed at three months and then at six months, and in the end a total of nine months was completed. Fieldwork came to a natural end when the DO resigned from her post to take a job in a different museum. A total of 32 days of fieldwork were completed over the nine-month period. The main activity that I participated in was the accessioning of archaeological finds from the excavation of an Anglo-Saxon cemetery, St Thomas.[18] This accessioning task was eventually the focus on this study. However, I also participated

[17] I have qualifications in the conservation of museum objects, including archaeological objects, and eight years of experience working in conservation in the cultural heritage sector.
[18] 'St Thomas', a pseudonym, refers to the site of archaeological excavation.

in other documentation projects that involved accessioning, data entry and data editing, and I sometimes shadowed the DO as she responded to queries from colleagues.

The DO's office was in the curatorial department at the main Museum A site in the city centre. However, the accessioning work was carried out at the off-site store where the artefacts were housed. This was a 45-minute journey from the main site by public transport, so when working there we met at the store in the morning and spent the day there. Of the 32 days spent working with the DO, 16 days were spent at the main Museum A site and 16 days were spent off site. Of these, eleven were spent working with the St Thomas collection. Other days were spent at a different off-site store working on other projects.

The off-site store was a spacious Victorian building with cavernous open areas that were filled with metal storage units installed in rows so as to create aisles between them. Each storage unit typically consisted of shelves housing lidded cardboard boxes, or metal drawers filled with bags or boxes of archaeological finds. A small office space was partitioned off to one side, and this is where our documentation work took place. This office housed two large worktables where artefacts could be packed, unpacked and examined, two desks with PCs and typical office storage furniture. Since it was partitioned, it was lockable and also heated.

There were no members of staff permanently based at the off-site store and so the DO and I were always the only people in the office. The storage areas were also usually deserted. This meant that work usually continued uninterrupted for the entire day, without distractions. The DO was very focused on the documentation task, rarely stopping to do something different such as attend to emails. During the documentation task the DO and I

would work in tandem at the desk, usually one using the PC, the other handling the artefacts and the records. We worked as a pair, for example, one person taking measurements for the other to enter into the spreadsheet. If the task became complicated, then this arrangement would break down and we would have a discussion to try and figure out the problem.

The working day was relatively short since Museum A volunteers usually worked from 10am to 4pm, with an hour break for lunch. The museum store had a communal area for lunch which was always busy at lunchtimes since there were no shops or cafes in the immediate vicinity of the site. Museum A was one of several museums that used the storage facility, so there were typically many staff and volunteers from other museums working there. During the nine months of fieldwork the DO and I developed a friendly working relationship. This was strengthened by the lengthy, intensive sessions of working and the shared lunch breaks, but also came about since we were of a similar age and found that we had similar interests both inside and outside of work.

There was no explicit deadline for completion of the accessioning of the St Thomas finds, but the DO planned to process around 30 finds per day and so managed the time accordingly. For example, there were occasions when she cut short the deliberations in order to make a final decision with a comment such as, 'we've spent enough time on this'. So, it was never necessary for me to work beyond 4pm, and there was always enough time to tidy the workspace before departing for the day.

When I began volunteering at Museum A in October 2016, the DO had already been working on the St Thomas documentation for several months, having taken over the project

from a predecessor. When I started, finds from 60 of the 388 graves were already accessioned and 265 CMS records had been created. By the end of my fieldwork nine months later (July 2017), finds from 165 of the 388 graves were accessioned and 553 CMS records created, so around 43% of graves had been accessioned. The DO left Museum A in September 2017 and as far as I know the project is now on hold. During fieldwork I was personally involved with accessioning finds from 18 graves, a total of 141 finds.

3.4 Ethical considerations and researcher identity

Ethnography involves self-identification with, and membership of, a particular group (Doloriert and Sambrook, 2012) and as such involves ethical considerations due to the impact the researcher has on their research setting and the participants. Participant observation brings particular concerns due to the intimate involvement of the researcher in the fieldwork context (DeWalt and DeWalt, 2011), although Watson argues that all ethnography involves unavoidable participation to some extent through shared experiences and close interactions (Watson, 2011). The 'consequential presence' of a researcher (Emerson et al., 2011, 4) is an inescapable part of the ethnographic approach, and even the unobtrusive observer may influence events in the field. This is particularly the case when the observer actively participates and contributes to the activities that they are observing (Vinten, 1994). Awareness of self, the role and identity of the individual researcher, as well as awareness of the assumptions and preconceptions that they bring to the field all add reflexive depth to the researcher's interpretation of their observations. This is particularly the case with autoethnography where the researcher is part of the story (Anderson, 2006). A participant researcher is not a detached observer but should still aim to maintain a balance between participation and scientific inquiry (Dopson, 2003).

During my fieldwork, my overt presence as a researcher was maintained throughout, and I was consistently open about the research and its aims from the outset. All participants gave written, informed consent before participating in the research. All participants requested anonymity and so their names have not been used in this thesis. The main risk to the participants and to Museum A was reputational and came from the scrutiny of an aspect of museum work that would not otherwise be made public. Pseudonyms have therefore been used where appropriate not only for the organisation and for individuals, but also for potentially identifying elements such as the name of the archaeological site.

Being a volunteer brought immediate legitimacy to my presence, not just with the DO but also with other organisational members that I encountered. Non-participatory researchers have reported having to avoid eye contact so as to be unobtrusive, or even having to remind participants to ignore them (Pettigrew, 1999), whereas the participatory researcher has a valid reason to be in the workplace. Volunteer status also meant that there were no difficulties in bringing fieldwork to an end since volunteering at Museum A was always temporary work whose duration was mutually agreed by the museum and the volunteer.

The legitimacy of my presence at Museum A was strengthened by my contribution to the documentation work of the department. I was able to apply my personal skills, knowledge and experience in completing the documentation work, not just on the St Thomas project, but on other projects during fieldwork, a contribution that was gratefully acknowledged by the DO's line manager. However, I aimed to balance my contribution with my intention to conduct a naturalistic ethnography. For example, we performed the documentation task within the constraints of what was available to us, but as a researcher I was keen to collect data from multiple sources when opportunities arose. This included data that could have a

direct impact on our performance of the task. I chose to limit the scope of my data collection so as to keep within the bounds of what was readily available. For instance, I did not pursue the option of obtaining records from the Conservation Department since this was not something that the DO would normally have done.[19] I therefore strove to moderate my impact on the research setting.

Multiple roles and identities during fieldwork can pose difficulties for a researcher but can also bring benefits. When seeking access at Museum A, previous experience in the cultural heritage sector led participants to view me as an insider therefore easing their acceptance and trust in me. This meant that access was granted readily. As acknowledged by other researchers, trust is needed in order to gain acceptance in the field, and this is greatly assisted by shared interests, which can be professional or personal (Cooper et al., 2004; DeWalt and DeWalt, 2011). Finally, my previous experience meant that I was broadly familiar with key aspects of museum practice. However, this familiarity meant that there was a need to make 'the familiar strange' (Hammersley and Atkinson, 2007, 231) and be open to observing documentation work without assumptions and suppositions that occur when there is a tendency to assume one knows what is going on (Hammersley and Atkinson, 2007). It was therefore an advantage that I had not done documentation work before, or worked in a museum.

[19] Since most of the conservation treatments were carried out in the 1980s before conservation records were computerised, gaining access to the records may have been time consuming for myself and for staff from the Conservation Department.

3.5 Data collection

At the start of my fieldwork, I approached my participant observation as a case study of documentation work at Museum A, and therefore aimed to collect different types of data on every aspect. This approach enables triangulation, as is characteristic of case study research, since diversity in data collection methods leads to stronger substantiation (Dopson, 2003; Eisenhardt, 1989; Yin, 1994). Similarly, studies of routines typically involve a diversity of data sources to enable researchers to build a rich understanding of the behaviours around the performance of the routine (Becker and Zirpoli, 2008; Feldman, 2000; Pentland, 1992; Pentland and Rueter, 1994). During the course of fieldwork, I became increasingly interested in the St Thomas documentation in particular, and my data collection focused on this particular accessioning task.

In the beginning when performing the task, I found myself overwhelmed by the intricacies of the setting, the artefacts, the records, as well as the sense of responsibility that we were working with archaeological material that was hundreds of years old. Over time I became accustomed to the task, but the exhaustion after a day's work did not diminish. It was almost impossible to record observations during the day, and it was only later that I was able to record what happened, and later still that I could reflect and analyse this.

Since my focus was the accessioning task, my account of our completion of the task was the main focus of my fieldwork observations. There were no social encounters to observe and record other than my interactions with the DO as only rarely were there other staff around. Therefore, my fieldwork notes consisted of a record of what we did and how we did it, with observations about anything anomalous or curious, and notes about anything that I did not understand that needed further investigation.

My observations recorded little of the 'social world' (Emerson et al., 2011) of the setting, with few quotes, descriptions of behaviours, attitudes or responses, other than my own. In this sense the fieldwork was not a typical ethnographic study since it sought to investigate routine action, rather than the emotions and feelings of participants (Jorgensen, 1989). Descriptions centred on what was done, in what sequence, for what duration, and in what quantity. Observations about the surroundings, social interactions, and the physical appearance of people were either non-existent or kept to a minimum. However, as an autoethnography, my personal experiences formed a crucial element of my notes.

During the first two days of fieldwork, it was both natural and expected to take notes. This was because there was a great deal to take in as the DO introduced me to the St Thomas accessioning work, explained the background and what we would be doing. However, by the end of day two, it was quickly apparent that there were very few opportunities to make a note of any observations, mainly because the focus of attention was entirely directed to the documentation task. Due to the intensity of the work, it was difficult to find any natural break in which to scribble in my notebook.

Occasionally it was possible to write down a detail which was considered important. This was an unobtrusive way to take notes without disrupting the documentation work, which would not only have been an unwelcome interruption but would also call attention to my researcher role (Emerson et al., 2011). These 'jot notes' (DeWalt and DeWalt, 2011, 141) were later written up as 'expanded notes' (ibid, 144), or full fieldnotes. Full fieldnotes were mostly written on the way home or soon afterwards. These notes were later typed up and anonymised as necessary.

The lack of opportunity to make notes during worktime meant that photography, using a phone, became a quick and easy way to record the work and the surroundings. The main purpose of the photography was to capture the appearance of the archaeological objects, and sometimes physical associations such as the position of objects and labels in a drawer. Photography was also a quick, easy and reliable way to record reference numbers. However, photography was only used when there was a real need due to the disruption it could cause.

During fieldwork I had access to documents associated with the St Thomas excavation such as correspondence and other records, although this access was limited by the time available. These documents, all available in physical formats, were stored at Museum A in the curatorial department, so were only accessible to me on fieldwork days. I was highly selective about making copies of documents, preferring to copy documents that I thought would be particularly useful or were typical of a particular type of record, for example, photography or X-Rays. Towards the end of fieldwork, copies of the information content used during the documentation work were obtained with the DO's permission. This consisted of copies of the relevant entries from the documentation records that we used. A copy of the new data on the St Thomas artefacts created for the CMS was also exported from the system.

Throughout my time at Museum A, I was also able to obtain copies of documents relating to the Museum A's CMS such as guidelines and training notes, as well as screen shots and print outs from the CMS itself. Finally, additional corporate documents, such as policies and strategy documents, annual reports and reviews and job advertisements, were used to develop my understanding of Museum A as an organisation.

3.6 Data analysis: Routines as an analytical perspective

Routines have long been of interest to organisational scholars as a prevalent part of organisational activity. Defined as repeated patterns of action, they can be characterised as stable, rule-based and even mindless (Ashforth and Fried, 1988; Becker, 2004; Pentland and Feldman, 2005). However, Pentland and Feldman have considerably developed our understanding of routines by proposing a conceptual framework that consists of, firstly, a generalised script: the patterned sequence of actions that they refer to as the 'ostensive' aspect; and secondly, the performative aspect of the routine (Pentland and Feldman, 2005). These aspects interact with each other, and with the artefacts that sit outside the routine (Figure 1).

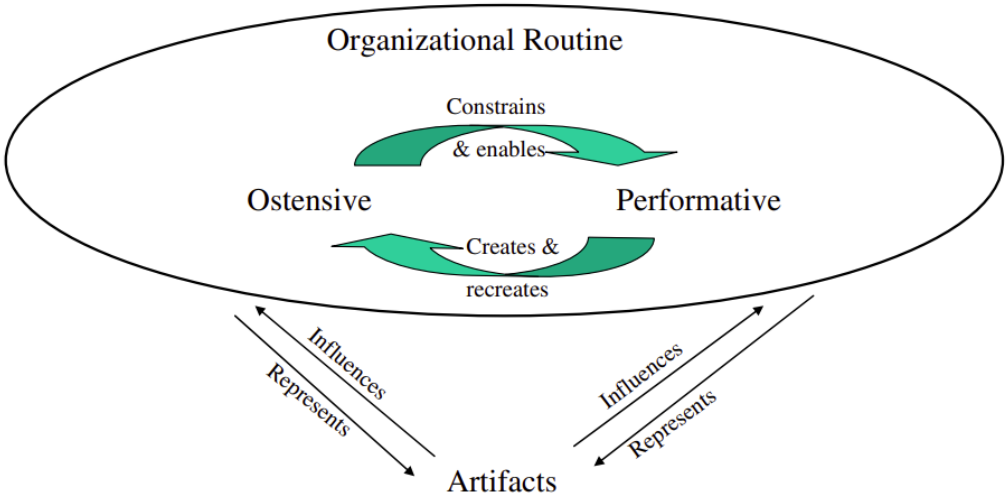


Figure 1: The elements of an organisational routine (Pentland and Feldman, 2008, 241).

This theoretical model draws on the findings of empirical studies that highlight the unstable nature and flexibility of routines. For example, in Feldman's ethnography of routines in a housing organisation she found routines to be changeable and dynamic as participants used their discretion to shape the way actions were planned and enacted, which in turn affected outcomes (Feldman, 2000). In a contrasting perspective, Pentland and Rueter's study of a

call centre found that the problem-solving of call handlers would appear to be highly variable, but on analysis could be seen to consist of grammars of action which captured the underlying recurrent structure (Pentland and Rueter, 1994).

These two examples highlight, in contrasting ways, the stable but variable aspects of routines. By separating out the ostensive and performative elements of routines, Pentland and Feldman account for the apparent contradictions in patterned action: routines can be observed to be highly variable because the individual performances of the routine are affected by the circumstances in which the performance takes place. Routines are therefore 'generative systems' whereby each performance is essentially an improvisation in response to the conditions in which the routine is performed (Feldman and Pentland, 2003; Pentland and Feldman, 2005). Seen in this way, routines are not mindless, but are 'effortful accomplishments' (Pentland and Rueter, 1994). On the other hand, the unchanging ostensive element of routines lends permanence and stability to action that reduces cognitive demands and helps organisational members cope with uncertainty (Becker, 2004).

Empirical studies involving routines have led to insight into their role in organisational behaviour (ibid). For example, Gittell examined the role of routines, along with boundary spanners and team meetings as coordinating mechanisms that facilitated interaction among participants (Gittell, 2002). While Segelod's study viewed investment manuals as written routines with a role in controlling and coordinating organisational behaviour through standardisation of action (Segelod, 1997). Other studies have also found routines to be a useful point of stability from which to observe the dynamics of organisational learning and change (for example Edmondson et al., 2001).

Aside from studies of the role of routines in organisational behaviour, Becker and Zirpoli showed how routines can be used to study the *causes* of organisational behaviour (Becker and Zirpoli, 2008). They operationalised Pentland and Feldman's conceptual framework in their investigation of a particular routine in product development at an engineering centre. Their study demonstrated the analytical power of systematically unpacking the ostensive and the performative aspects, and the interaction between the two, to understand how the task was accomplished.

By analysing performances of the task and contrasting this with the process as designed, they could not only describe how the task was carried out in practice, but also observe patterns in these performances. This led to insights into the factors and conditions that influenced those patterns. Their analysis showed where the performative deviated from the ostensive, which opened the way for further investigation of the causes of these deviations. Becker and Zirpoli's research provided an account of performative details that would be otherwise invisible to those who managed the task. Furthermore, the ostensive-performative perspective on routines goes beyond the design and implementation of rules to encompass the social setting, thus offering qualitative insight not afforded by other methods of performance management such as the use of performance indicators, or methods of analysis such as workflow analysis (ibid).

Following Becker and Zirpoli, I applied Pentland and Feldman's conceptual framework on routines in my analysis of the accessioning task. Accessioning was recognisable as a routine because it was recurrent task (completed about 30 times a day) and the completion of the task involved recurrent actions. These recurrent actions involved using the same array of documents and artefacts each time, and also consistently led to the same outcome:

the creation of entries on Museum A's CMS. These recurrent elements of accessioning meant that the task leant itself to 'structured analysis' (Maylor and Blackmon, 2005, 351) using routines as an analytical perspective. In applying Pentland and Feldman's model (Figure 1), I first established the ostensive element of the accessioning routine, and then analysed individual performances. These two stages of analysis are discussed in turn.

3.6.1 The accessioning routine

The task that was the focus of this study was the accessioning of a large group of over 2,000 finds from the archaeological site at St Thomas. This was retrospective documentation because the group was acquired by Museum A in the 1980s, and despite being re-documented in entirety on at least two occasions subsequent to acquisition, the finds had not been accessioned, so had not been assigned museum numbers or listed on the CMS. Our task was to accession the finds so that they were, for the first time, officially entered into the museum collection. An account of the background to the archaeological excavation and acquisition of the archaeological materials is given in Chapter 4. This section looks at how I defined the ostensive element of the routine and analysed our performance of the routine, leading to the findings that are presented in later chapters.

In Becker and Zirpoli's study at a vehicle engineering centre, they describe a highly regulated routine that was defined by nearly 100 pages of documents such as standard operating procedures, checklists and specific technical parameters (Becker and Zirpoli, 2008). In contrast, there were no documents at Museum A that explicitly defined the ostensive aspect of the accessioning task. However, the documentation standard Spectrum 4.0 sets out eight 'primary procedures', including acquisition, cataloguing, and

retrospective documentation (Dawson and Hillhouse, 2011).[20] These procedures briefly described the steps required, for example, the acquisition procedure consisted of steps to confirm and record the decision to acquire the item and establish legal ownership status, followed by steps required when the item enters the museum (see Figure 2). However, our task differed from the acquisition procedure because the archaeological finds had entered the museum many years ago and records already existed.

For retrospective documentation, the Spectrum primary procedure addressed the steps to develop and monitor a plan for tackling documentation backlogs, rather than the actual documentation process itself. However, the process was outlined in an advice document, published to accompany Spectrum 4.0 (Collections Trust, 2011). The elements in the process from the Spectrum advice broadly mapped onto the accessioning task that we carried out: make use of existing information resources; compare these with the artefacts; and update the museum documentation as if it were a new acquisition (Collection Trust 2011, 4). This was therefore closely related to the acquisition routine but reconciling this with existing records.

[20] Version 4.0 of Spectrum (Dawson and Hillhouse, 2011) was available at the time of my fieldwork. Spectrum 5.0 was published subsequently in 2017 (Gosling and McKenna, 2017) so was available during data analysis and is cited elsewhere in this thesis. In Spectrum 5.0 there is one additional primary procedure, bring the total to nine.

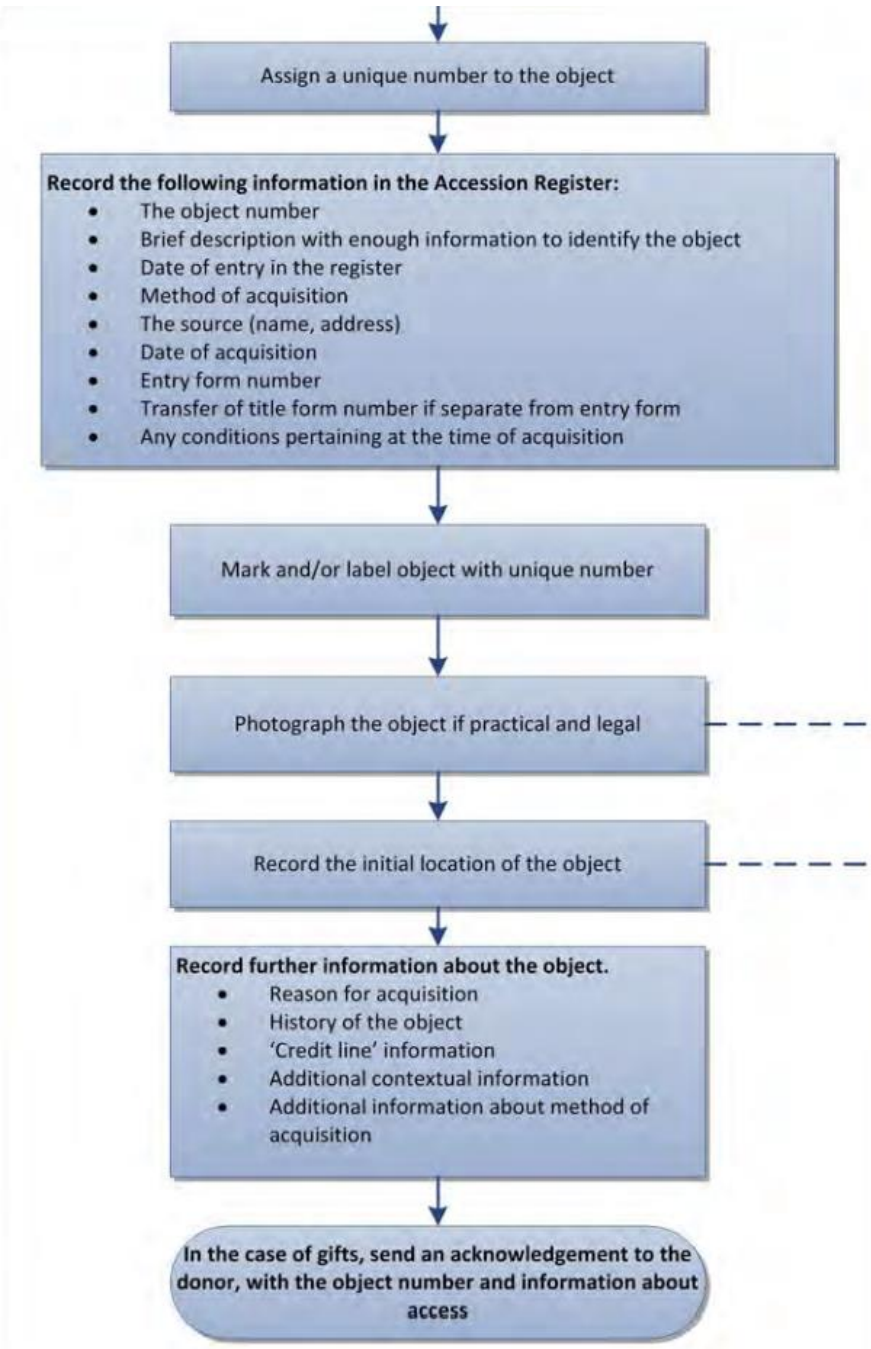
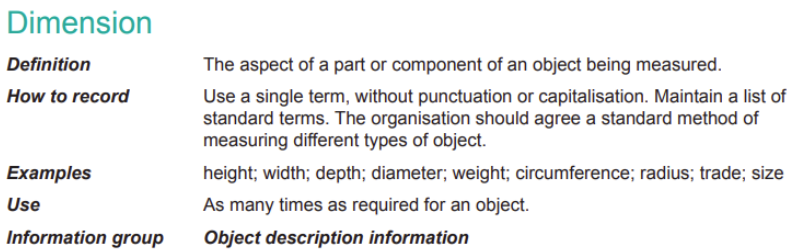


Figure 2: Extract from acquisition primary procedure in Spectrum 4.0 (Dawson and Hillhouse, 2011, 29).

Beyond this, there was copious guidance in the Spectrum Appendix with over 160 pages listing the types of information that should be recorded, and how this should be done, for example see Figure 3 for a definition of 'dimension' and how it should be recorded (Dawson and Hillhouse, 2011). At Museum A, the recording of information was similarly regulated, with over 50 guidance documents including guidelines on how to catalogue specific types

of items such as papyrus, coins, clocks and watches.[21] A comparison between these guidelines and the Spectrum information requirements was beyond the scope of this study. However, these guidance documents related to how users should enter information on to the CMS and were necessary due to the immense diversity of the collection and the need to maintain consistency on the CMS.



Dimension

Definition	The aspect of a part or component of an object being measured.
How to record	Use a single term, without punctuation or capitalisation. Maintain a list of standard terms. The organisation should agree a standard method of measuring different types of object.
Examples	height; width; depth; diameter; weight; circumference; radius; trade; size
Use	As many times as required for an object.
Information group	***Object description information***

Figure 3: Extract from Spectrum 4.0 Appendix 1 Information Requirements (Dawson and Hillhouse, 2011, 73).

So, while there was no documentary representation of the ostensive element of the accessioning routine at Museum A, the task was designed in keeping with the Spectrum standard, along with the extensive 'rules' governing the way information should be recorded.

The following description sets out the structure of our accessioning routine as four steps. This is based on the requirements of the Spectrum standard, the process described in accompanying advice, and our experience of how the routine was typically performed. In

[21] These guidance documents were what was available at the time of data gathering, so do not cover all types of object in Museum A' s collection. In some instances, there were multiple versions of guidance where documents had been updated, and several documents concerned guidance for using the CMS, rather than rules for cataloguing specific types of item.

order to complete the task, we relied on two previous documentation records of the finds: the catalogue (written by the Anglo-Saxon curator), and a card index.

Step 1) Identify the find listed on the accessioning spreadsheet

This spreadsheet had been set up by the DO's predecessor specifically to collate the information for the St Thomas finds. The information from this spreadsheet was entered onto the CMS later. There were several practical reasons for using an intermediate document, including a slow and unreliable network connection at the off-site store which made the CMS slow to respond, and the CMS' user interface that only displayed one record at a time, making it difficult to compare items. The list format of the spreadsheet was essential when working with associated groups of finds when an array of information needed to be cross-referenced. The accessioning spreadsheet was populated with information that had been copied across from the catalogue (a separate document). This information included name, description and dimensions of each find, so we completed Step 1 by checking this information and comparing it to the actual artefacts to find one that matched.

Step 2) Verify the identification numbers of the find

The finds had been previously documented and each find already had two identification numbers, known as the excavation number, and the SF ('small finds' or 'special finds') number. These numbers needed to be included in the CMS record because they were the main way to link the finds with previous documentation, including excavation records. Once Step 1 had been completed and the relevant find was identified, the excavation number was obtained by checking the label associated with the find, and it was then entered

onto the spreadsheet. Occasionally, the SF number was also written on the label, but if not, we could obtain it from the card index.

Step 3) Assign a museum number

The museum number was a unique numerical identifier that was used to identify a museum artefact, signify its status as an accessioned item, and link it to its record on the CMS. When a new number was assigned to an artefact, the number was entered on to the accessioning spreadsheet, and a numbered sticker was applied to the find's housing.

Step 4) Revise accessioning spreadsheet as necessary

As well as the old identification numbers and the new museum number, we obtained fresh observations of the finds for dimensions and weight and entered these measurements onto the accessioning spreadsheet. We then revised the name, material and description to fit within guidance for recording information on the CMS.

The four steps in the accessioning routine are summarised in Table 2, along with an example of the accessioning of one of the finds. Compiling the information on the accessioning spreadsheet was only one element of our work, although it was the focus of this analysis. After collating the information for the spreadsheet, we also photographed, repacked and relabelled the finds, which were then moved to a permanent location. When this had been done, the identification code for this location was entered onto the accessioning spreadsheet. Finally, the information from the spreadsheet was entered onto the CMS, and the digital photo was uploaded to the Museum's image database and linked to the relevant CMS record.

3.7 Analysing the performance of the routine

Each performance of the accessioning task resulted in the creation of a CMS record populated with the information that we had collated on the accessioning spreadsheet. Each find that we accessioned was photographed, rehoused, and relabelled. However, while the outcomes of the completion of the task was consistent, we experienced great variety in the difficulty of performing the task. My analysis aimed to examine the factors that shaped our performance and influenced our experience of difficulty.

	Process	Example
Step 1) Identify the find	Check the accessioning spreadsheet for name, description and dimensions	Name: Knife Description: Angled back, straight cutting edge, mineralised remains of horn handle on tang. Length: 10.3cm
	Identify the find that matches	
Step 2) Verify the identification numbers	Check the label for the excavation number and SF number and enter on the accessioning spreadsheet	 Excavation number: 135(2) SF number: 622
Step 3) Assign a museum number	Assign a museum number Write the museum number on a sticker and adhere to the housing. Enter the museum number onto the accessioning spreadsheet.	Museum number: 479
Step 4) Revise accessioning spreadsheet	Weigh and measure the find, edit dimensions and weight on the accessioning spreadsheet; edit material(s); edit description	Length: 102.5mm Weight: 16.6g Material(s): Iron; horn Description: Iron knife; angled back, straight cutting edge. With mineralised remains of the horn handle on tang. With a bag of fragments.

Table 2: The four steps of the accessioning routine.

Since I was particularly interested in understanding difficulty, I selected the most challenging performances for analysis. This 'theoretical sampling' (Eisenhardt and Graebner, 2007; Glaser and Strauss, 1968; Yin, 1994) was not intended to be representative of what typically happened, but instead focussed on events that were of particular relevance for the research question.

The St Thomas archaeological site had been a cemetery, and the graves had been excavated one by one. The finds were stored in groups according to the grave where they had been uncovered. Most graves had contained some artefacts, and of the 18 graves that I worked on, the majority had five or less finds. However, there were four graves which were notable for the quantity of artefacts that were recovered and the extent of discrepancies that we encountered during the accessioning tasks. The combined total of documented finds from these graves (graves numbered 97, 134, 135 and 161) made up roughly two thirds of the total number of finds that I accessioned during my fieldwork. Of these, the most abundant cache was in grave 161, where over 30 finds were recovered.

In the first instance I collated the documentation records for each artefact onto datasheets, see Figure 4 for an example. I created 95 datasheets, with one datasheet per find. I designed the datasheet for ease of comparison between the different records, so not every piece of information was included. Instead, I selected the types of information that had been used most extensively during the accessioning task. I also included the information that was entered onto the CMS. Each datasheet also included a digital photo of the find which was taken at the time of accessioning (not included in Figure 4).

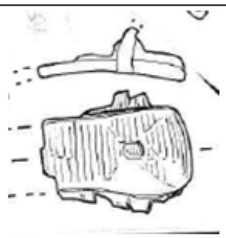
Documentation record	Information content from record				
	Excavation number	SF number	Name	Length	Description
Catalogue	nd	nd	Frag	2.6cm	Iron staples and nailed bindings. Tongue-shaped frag, terminal pierced by rivet, mineralised beech (Fagus sp) on surface
Finds card	Grave 97 (8)	SF 542	Rectangular fragment of iron	2.65cm	Rectangular fragment of iron, pierced by a small rivet for attachment, with substantial traces of wood on the underside. It was found at the foot of the grave in association with other wood and iron fragments, including several angle-irons.
Label	97(8)	nd	nd	nd	nd
CMS entry	97(8)	542	Mount	26mm	Iron tongue-shaped fragment from a mount, with terminal pierced by a rivet and mineralised beech wood on surface.
Finds card drawing	nd	nd			
Illustration A	nd	nd			
Illustration B	Grave 97 (8)	nd			

Figure 4: Example of a datasheet.

The second stage of my analysis involved systematically recording the performative aspect of the routine. Some studies have made use of archival data from tracking software for analysing sequences of action, such as the invoice management system studied by Pentland, Haeren and Hillison (Pentland et al., 2011). Other studies have aimed to capture the participants' perspective through observation, interviews and participation (for example, Becker and Zirpoli, 2008), or by asking participants to record their activity on 'action sheets' (Pentland, 2003). In contrast, Feldman's ethnographic approach involved

observation and participation at a housing organisation over a four-year period, which informed her own narrative account of the routines that she observed (Feldman, 2000).

Since I had participated in the routine myself, and had gathered copies of the records I had worked with as part of that routine, as well as a copy of the resulting CMS records, I was able to retrospectively write my own account of each performance of the accessioning task, producing my own equivalent of Pentland's action sheets (2003). In total, I wrote narrative accounts of 95 performances. These accounts were written after fieldwork had ended, so did not impinge on the fieldwork itself, but this approach was heavily reliant on my recall of the accessioning work. I made extensive use of the datasheets, and my fieldnotes and photography.

3.7.1 Discrepancies and difficulty

When comparing our performance of the accessioning task with the ostensive sequence shown in Table 2, it was apparent that our difficulties lay with Step 1 (identifying the find) or Step 2 (verifying the identification numbers). In both instances we cross-referenced information from a variety of sources, but this information frequently did not match up, and our experience of difficulty varied according to our ability to account for these discrepancies: if we could satisfactorily explain the differences between the records then we could confidently complete the task.

I used a structured approach to analyse discrepancies and our experience of difficulty. This approach differed from other empirical studies of routines that focused on the sequence of action. In these studies, performances were analysed by coding each action and then representing each performance as a string of numerical or letter codes (for example,

Pentland, 2003; Pentland et al., 2011; Pentland and Rueter, 1994). However, by the time fieldwork came to close I was already focussed on discrepancies between the records as a major cause of our difficulty in completing the accessioning task. Therefore, when I wrote the 95 narrative accounts of each performance of the routine, I described the discrepancies we encountered, our explanations of those discrepancies and where those explanations came from, and also the impact of the discrepancy.

A sequence of action was used to represent the ostensive aspect of the documentation routine and locate the problematic steps of the routine, but an examination of 'sequential variety' (Pentland, 2003) in the performance of the routine was not the main aim of my analysis. There were other reasons for not addressing sequence further: firstly, it would have been challenging to record the performances in that way, since what we actually did in our performance of the task was not manifest in a stepwise sequence that could be described in each case. In the most complex cases, we would spread out the documents on the desk and discuss which records matched with which finds. Some types of action could be discerned: evaluating, trialling alternative explanations, matching, but the performances were not easily reduced to sequences.

Furthermore, these were performances that were short and intense, typically taking five to ten minutes. This is in stark contrast with the routines in other empirical studies that took place over a few days (such as Pentland and Rueter's call centre cases), weeks (in Becker and Zirpoli's study, the routine ran in fortnightly cycles) or even longer (for example, Feldman's routines took place over the course of a year (Pentland and Rueter, 1994; Becker and Zirpoli, 2008; Feldman, 2000).

Therefore, rather than code my narrative accounts for the actions in each performance, I inductively derived a coding scheme for different types of discrepancy (Table 3) and used this to code each performance of the accessioning task. To facilitate this, I used my narrative accounts to derive a list of all discrepancies we had encountered, such as recorded dimensions not matching the artefact or missing labels, and categorised these by type according to the coding scheme. This list helped me to code the discrepancies associated with each performance. We frequently encountered more than one type of discrepancy in the same case. Finally, I also coded each performance according to my perception of the difficulty of each case. I used a five-point scale where 5 was the most difficult.

Type 1	Information different but correct	Information from different records referred to the same object, but was different
Type 2	Information correct to the best of practitioner's knowledge, but actually incorrect	Information was subsequently found to be incorrect
Type 3	Information incorrect	Information was compromised through accident or error
Type 4	Incomplete information	Information was compromised by being incomplete or missing
Type 5	Unexplained discrepancies	Many possible explanations, but none satisfactory

Table 3: Coding for types of discrepancy.

From this analysis it was apparent that types of discrepancy did not fully account for our experience of difficulty, and my attention shifted towards the causes of the differences between the records. I carried out further analysis on the documentation records by making direct comparisons between commonly occurring types of information, cross-referencing them across all records. This brought clarity to the nature of the differences between the records and deepened my understanding of the likely conditions that led to these differences, that is, the circumstances in which the records were created, i.e. the context of

creation. I was able to relate our experience of difficulty with the extent to which we understood this context.

Finally, I tested my findings about the role of context by revisiting the narrative accounts of each performance, to see how our understanding of context influenced our explanations for discrepancies and thereby our experience of difficulty. This comparison between the constructs and the data verified the patterns and relationships that I had discerned in the data, lending my findings construct validity (Eisenhardt, 1989).

3.8 Limitations of this study

It will be apparent from this account that I was not working in isolation while performing the documentation task but was always with the Documentation Officer. The documentation task was therefore a shared activity. We worked closely together, coordinating our activities, but also for the more difficult instances of the task we problem solved together, sharing opinions, suggesting solutions and discussing the options before agreeing actions. When there was something I didn't understand or agree with I raised this, but I did not gather data on the DO's perspective, thoughts, feelings or decision-making. My account of the documentation task is therefore entirely one-sided, yet I refer to 'our' performance of the task because we were performing as a pair.

The significant limitation of this is that 'difficulty' is my personal response to my experience of performing the task, and the DO may not have regarded the task as difficult at all. However, given the intensity of the work, taking the time to record her perspective would have been obtrusive and disruptive, or would have required high demands on her time. There were opportunities to chat with the DO about our documentation work at the

beginning and end of the day, and over lunch, and while these interactions were only recorded in fieldwork notes they did validate my observations and experiences. Difficult cases were those where information content and the artefacts did not match well and there was a high degree of uncertainty over which records referred to the artefacts. Our performance of difficult cases was characterised by discussion of alternative explanations, occasional disagreement, and minor expressions of frustration, anxiety or exasperation.

Similarly, as we became familiar with the records, we developed an understanding of the context in which they were created, but I did not collect data on the extent of the DO's understanding of context. Rather, my account in the following chapters is based on my personal experiences and supported by my subsequent analysis and reflections. However, since the documentation task was a shared activity, I refer to this understanding of context as 'our' understanding because of the significant influence it had on our completion of the task. One way to valid my findings would have been to return to Museum A post-analysis to interview the DO. However, by then she was working in a different museum and we were not in contact. The lack of explicit validation from the DO is a weakness in the findings from this study,

3.9 Chapter summary

In the study presented here, the participation of the researcher was an invaluable way to experience invisible work and hidden processes that museum practitioners themselves had trouble articulating and explaining. The resulting data and subsequent analysis showed that a task was designed to be (and expected to be) straightforward information processing was at times complex and highly challenging. Participant observation was therefore the best way to understand something that was not easily observable and was not necessarily fully

understood or easily explained by those practitioners who were the task-doers or supervising the task-doers.

During this study of museum documentation, my research method progressed from interviews in the exploratory phase, to participatory fieldwork, to the collation of content from documentation records and finally to analysis of our performances of the accessioning task. My fieldwork started as an ethnographic case study of the work of a Documentation Officer (DO) at Museum A. By working with her, my aim was to understand the challenges of documentation work, and I had the opportunity to explore many aspects of her role as I gained an insight into her day-to-day work. As a participant-observer, I contributed to several of her projects, and I soon found the accessioning task to be challenging. This task, the process at the heart of the department's backlog, became the focus of my data collecting, and the main project I participated in, the St Thomas archaeological site, became the focus of this study.

By using routines as an analytical perspective, my aim was to understand the underlying causes of our difficulties in completing the accessioning task. I was able to identify the problematic steps in the sequence of the accessioning routine, although during fieldwork I had already become acutely aware of the difficulties caused by discrepancies between the different records. Using structured analysis, I studied these discrepancies in detail. My findings, concerning the causes of these discrepancies, and how this affected the difficulty of completing the task, are discussed in the new few chapters.

4 The documentation records and their provenance

This chapter describes what we understood of the discovery, excavation, and post-excavation documentation of the St Thomas archaeological finds.[22] Most of this understanding was obtained from associated documents at Museum A and so is limited to what survived in those papers. The most useful associated documents included some correspondence relating to the work done at Museum A after acquisition, and an academic paper published by the archaeologist. We also made inferences based on the records themselves and what we understood of museum and archaeological practice. In describing our understanding of the circumstances in which the finds were documented, this account describes the provenance of the resulting records: why they were created, by whom, when and where.

Our understanding was necessarily broad due to the lack of any comprehensive record of events amongst the documents at Museum A. However, we gleaned enough to construct a partial chronology. This has been supplemented by subsequent research that I have completed, for example, using published sources about rescue archaeology. This supplementary research has provided explanatory detail to the account.

After introducing the chronology, this chapter presents an overview of the key contextual factors relating to the museum context that affected the documentation of the finds: the development of knowledge of the archaeological group (scholarship); the deterioration of

[22] St Thomas is a pseudonym, used for reasons of confidentiality.

the archaeological material post-excavation (decay); and the management of that deterioration (conservation). These factors were important aspects of the context in which all of the documentation records were created. The sets of records are then described in detail, according to my analysis of the chronology as three phases of documentation.

4.1 Excavation, documentation, publication

4.1.1 The archaeological site at St Thomas

According to correspondence and associated documents, the Anglo-Saxon cemetery (AD500-700) at St Thomas was excavated between 1969 and 1971. The presence of the cemetery was first discovered when human bones were unearthed during digging work to prepare the site for the expansion of the municipal refuse dump. Work was suspended for one month to allow for archaeological excavation before the area was bulldozed. Two further areas at the site were excavated in 1970 and 1971 before being destroyed. The archaeological work was funded by the UK government through the Department of the Environment (DoE). It was government policy at that time to fund 'rescue archaeology' where buried heritage would otherwise have been destroyed, for example by building works or infrastructure projects (Historic England, 2015).[23]

By the end of 1971, a total of 388 graves had been unearthed, most of which contained human remains and some objects (referred to as 'finds'). In total, nearly 2,700 finds were

[23] By the time the policy ended in 1972, well over 1,000 excavations had been carried out (Butcher and Garwood, 1994). Current legislation places the financial burden on the developer. See report by Historic England for a review of the policy and subsequent legislative changes (Historic England, 2015).

retrieved. These were typical of what would be expected from such an early archaeological site, consisting of metals (mainly iron and bronze), pottery, animal bones, and some gemstones.

A local archaeologist was appointed to lead the excavation work for a fee, with some technical support from DoE.[24] The extent of this support is not clear but there was photography of the site, including a photograph of each grave, conservation work and X-rays of the most vulnerable finds. Correspondence shows that during the 1970s the most fragile finds, along with finds from graves 1 to 89, were sent to the Ancient Monuments Laboratory (AML, the national laboratory for supporting archaeological work in England at that time). Urgent conservation work was also carried out by the conservation department at a national museum (not Museum A), and by conservation students at a London University up until 1980. It is not clear where the finds were being stored at this time.

At the time, provision for rescue archaeology did not extend to the long-term preservation of the finds and associated documents, so arrangements for resulting excavated materials needed to be made on a case-by-case basis. However, in the early 1980s all human remains, finds and papers associated with the St Thomas excavation were acquired by Museum A and were moved there. According to the correspondence, Museum A agreed that all remaining conservation work would be carried out by their in-house conservation

[24] The lead archaeologist was a local schoolmaster, not a professional archaeologist. At that time, archaeology in the UK was in the nascent stages of professionalisation and had yet to organise as a commercial sector (Darvill, 2012).

department. This was done during the 1980s and, at some point, the finds were rehoused in storage drawers. The human remains were housed separately and are not included in this account, which only concerns the finds.[25]

4.1.2 Documentation and publication of the site

The archaeological excavation and removal of material is a destructive process, and this is especially the case with rescue archaeology. At the St Thomas site, not only did the removal of material irreversibly disrupt the burials, but post-excavation, the landscape was dramatically altered so that today there is no trace of the Anglo-Saxon cemetery. The way that the site and the excavated materials were documented is therefore highly significant, because this constitutes the primary evidence of the site for future scholars (Barker, 1977; Brown, 2011; Renfrew and Bahn, 2005).

During archaeological fieldwork, the archaeologist has one chance to conduct and record their work, with no opportunity for a return trip. They have responsibility for documenting the site and any physical materials that are excavated and must do this in the way that they consider most appropriate (Drewett, 1999). There are a diverse range of excavation techniques in archaeological practice, as well as differing approaches to numbering terminology and measuring. Furthermore, the archaeologist needs to remain flexible in their approach because as the excavation progresses they may need to adapt in response to unexpected findings (Barker, 1977; Renfrew and Bahn, 2005). During rescue archaeology,

[25] Human remains from archaeological sites are not regarded as 'finds' by the archaeological community, and their excavation, care and study involve ethical, legal and practical considerations that are beyond the scope of this dissertation (see Brothwell, 1981; Drewett, 1999).

the archaeologist has additional challenges of circumstances that are largely out of their control such as limited time and other constraints.

Post-excavation, the long term preservation of the excavated material and documentation is essential for future study of the site ("CIfA regulations, standards and guidelines" 2014), and so the entire assemblage must be kept together and preserved *en toto*.[26] The archaeologist has a responsibility to ensure that their findings are disseminated in a timely way ("CIfA regulations, standards and guidelines" 2014; Drewett, 1999; Renfrew and Bahn, 2005). This was traditionally done through publication of an archaeological report, either as a monograph or an academic paper. An archaeological report typically described the project, the resulting data and included a catalogue of finds (Grinsell et al., 1974; Jones, 2003). However, at the time of the St Thomas excavation, the DoE funding did not extend to post-excavation work. Archaeologists were left to publish their work in their own time and with their own resources (Butcher and Garwood, 1994; Thomas, 1991).

The St Thomas archaeologist authored a journal article that was published in 1973 but this relatively short paper focused on observations on structural aspects of the graves. This publication did however provide us with valuable details of the excavation itself. The paper does not mention the finds, with only a very brief comment that the 'full' report was pending. In subsequent years, a small number of finds were listed in specialist publications

[26] In museums and archaeology, all materials associated with an archaeological excavation: human remains, finds, samples taken, textual and visual records, are considered as one entity referred to as an 'archaeological archive' (Pearce, 1990b; Perrin et al., 2014). An archaeological archive differs in form and content from an archive as defined by the archive community, so the term is avoided here so as to avoid confusion.

concerning, for example, the classification of Anglo-Saxon spearheads (Swanton, 1974) or pottery (Evison, 1979) but these publications focussed on typology and did not mention findings about the St Thomas cemetery as a whole.

According to surviving correspondence, by the time the St Thomas material was acquired by Museum A, it had been agreed that responsibility for the archaeological report would pass to Museum A's Anglo-Saxon curator. She had been part of the archaeological team at St Thomas, although she was not the lead archaeologist. The DoE agreed to support the publication of the archaeological report in the form of a monograph, with costs shared between DoE and the Museum. By then, illustrations of some of the finds had already been prepared by the DoE in-house drawing team in anticipation of publication.

Around this time, the finds were being conserved by the conservation department at Museum A, and a new record of the finds was completed, a card index. Later, the Curator compiled a complete catalogue of all finds for publication in the monograph, and more illustrations were commissioned from professional artists. Correspondence shows that publication was planned for the mid-1980s. However, the monograph was never published and by the late 1980s the DoE financial support was in question (the heritage section of DoE was by then known as English Heritage). In the 1990s, the Curator left Museum A,

taking early retirement for health reasons. There are currently no plans to publish the full archaeological report as originally envisaged.[27]

Although the archaeological monograph was not published, the Curator's catalogue of finds was published online at a later date. In 1998, two academics (external to Museum A) set up an online database (AnSax)[28] to collate data on finds from Anglo-Saxon burials in England. Their intention was to facilitate the study of these finds for the community of Anglo-Saxon scholars by providing access to the data. They collected data in 1999 and 2000, and, as of 2008, the database held data on finds from 53 Anglo-Saxon cemeteries, including the Curator's catalogue data from the St Thomas excavation. Finally, at the time of my fieldwork in 2016, the work to accession the finds from the St Thomas excavation was underway. The Curator's catalogue had been digitised for inclusion in the AnSax database and was available as a spreadsheet. This data formed the basis for our documentation work as we prepared entries for Museum A's CMS as part of the accessioning process. A rough chronology of the St Thomas finds is given in Table 4.

4.2 Recording and re-recording the finds

From the brief chronology above, it is apparent that there were numerous processes involving the archaeological finds: excavation and photography of the grave, documentation, conservation and X-ray, illustration, examination and cataloguing. Even before arrival at Museum A, the finds were processed in various ways, in different

[27] The current Anglo-Saxon curator is working on a publication that will include some of the finds from the St Thomas site, but this will not be an archaeological report.
[28] A pseudonym

locations and by different groups: first at the St Thomas site itself, then later at AML and at least two other conservation laboratories. A range of specialists were involved included the archaeological team, photographers, conservators, and artists. It is also apparent that many of these processes were not applied to the entire group, for example the most fragile finds were prioritised for conservation. Since acquisition by Museum A, further work has involved conservation, rehousing, and scientific analysis such as carbon dating.

Each of these processes involved creation and processing of records to document the activity and outcomes, but also to identify each find and keep track of where it was. In some cases, a process involved the creation of a specific artefact, for example a photograph or illustration. Therefore, over the 45 years since excavation, these activities have resulted in an extensive quantity of records, some of which were retained by Museum A, some by external groups.

Date	Event
1969 to 1970	Archaeological excavation at St Thomas site; 388 graves excavated; 2697 finds recorded
1970s	Conservation of finds at Ancient Monuments Laboratory and other conservation labs
1973	Publication of report, giving overview of site, by lead archaeologist
1980s	Acquisition of the collection by Museum A; on-going conservation work and processing of finds, including drawings; creation of draft catalogue by Curator
1998 to 2000	Creation of the AnSax database
2016 to 2017	St Thomas documentation project; finds from 165 graves accessioned

Table 4: Brief timeline of the St Thomas collection.

Amidst the vast array of records and artefacts, my analysis identified three distinct phases when the whole group were documented: at the time of excavation; around the time of entry to Museum A; and in preparation for publication of the archaeological report while at Museum A. There was also a fourth phase: the creation of records for the Museum's CMS as part of the work to accession the finds, which is still on-going. Therefore, after initial recording by the archaeological team, the entire group of finds were re-recorded two further times and is currently being re-recorded a fourth time.

The documentation records created during these phases were complete, systematic records of the entire archaeological group, recorded in a structured and consistent way. The creation of such an extensive documentation record was necessary so that each find could be individually identified and therefore could be tracked – particularly important when multiple activities such as conservation, photography and illustration were on-going. With nearly 2700 finds, the documentation of the entire group was a major undertaking, and with each phase of documentation, this was carried out to meet a specific need that existing records did not meet. Therefore, while these records ostensibly served the same function, with each phase a new record was created for a different purpose.

The circumstances around the creation of each record varied each time: these aspects of provenance are discussed later in this chapter. However, there were a few key contextual factors, relating to museum function and the nature of archaeological material, which were underlying aspects common for all these records: decay, conservation and scholarship. The creation of records in all phases of documentation took place against the backdrop of these three factors.

4.2.1 Decay: The deterioration of archaeological material

Archaeological materials that have been buried for centuries will have been subject to extensive decay until eventually reaching equilibrium with their surroundings. Excavation disrupts this equilibrium and exposes the materials to moisture, air and light that can greatly accelerate deterioration (Barker, 1977; Cronyn, 1990). Some materials will disintegrate almost immediately but others will deteriorate gradually, so long term care is vital for the survival of archaeological finds (Pye, 2001).

The processes of decay can be managed by control of factors such as exposure to humidity and light, but archaeological finds often remain fragile and continue to deteriorate long after excavation. Vulnerable finds may break when handled, but some materials disintegrate while in storage, particularly corroded metal finds (Cronyn, 1990). This can appear as gradual flaking or crumbling, or fragmentation, thus affecting the physical appearance of the material (ibid).

These physical changes in the archaeological finds mean that documentation records can become inaccurate over time, since much of the identification of the finds relies on reference to physical appearance: dimensions, number of pieces or a text description. This is turn is a reason for records to be updated when the finds are documented. So, with successive phases of documentation, the St Thomas records were not just adapted for a different purpose, but they were also updated by obtaining fresh observation from the finds themselves.

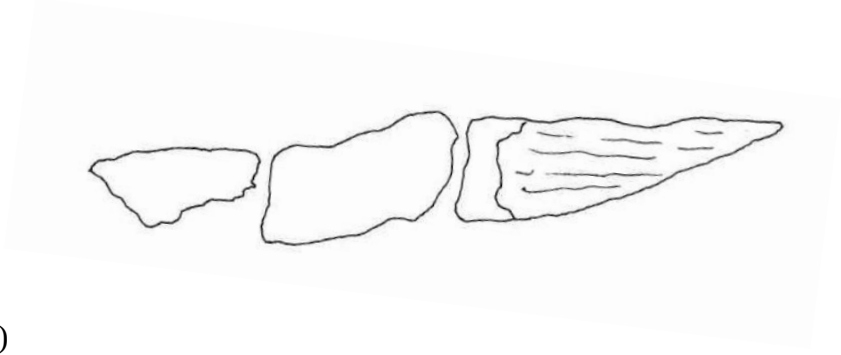
4.2.2 Conservation: The stabilisation of archaeological material

It is clear from the correspondence at Museum A that some of the archaeological finds from the St Thomas site required urgent conservation treatment, which was carried out at AML. Other selected finds were treated by different conservation teams until the entire assemblage was acquired by Museum A. At this point, all remaining conservation work was completed by the Museum's in-house Conservation Department.

The conservation department at Museum A maintains documentation records of all treatments, although these records are kept by the department and were not accessible during the fieldwork for this study. However, based on my personal experience of archaeological conservation, the treatments were likely to include delicate cleaning, repair and stabilisation of materials. This could also involve reattaching fragmentary pieces where there were clearly identifiable joining edges.

Some of these interventions could have a dramatic effect on the physical appearance of the finds, changing not only the dimensions, but also the shape and colour of the finds and the number of pieces. For example, Figure 5 shows a find before and after conservation treatment where three fragments were joined together). Conservation treatment, as with the decay of archaeological material, could therefore render documentation records out-of-date, and was a reason why re-recording of documentation required direct observation of the finds themselves.

(a)



(b)



Figure 5: Find 6 from grave 134: (a) drawing from finds card; (b) Photograph from time of accessioning. Length 12cm.

4.2.3 Scholarship: The development of archaeological knowledge

The aim of archaeology is to understand and explain the past, and this is achieved through the analysis of archaeological sites and material retrieved from those sites (Renfrew and Bahn, 2005). The phases of documentation of the St Thomas finds can be seen as stages in that analysis, contributing to the development of an archaeological understanding of the site, and to wider Anglo-Saxon scholarship. After the first record was created at the time of excavation, the creation of successive records involved documenting shifts in interpretation and changes in the way that interpretation was represented.

Technical activities involving scientific methods of analysis, such as radiocarbon dating, took place, although details were not available to me during fieldwork. Some analysis would have required the input from a specialist, for example, the identification of tree

species from tiny fragments of wood. The archaeological, archaeological science and archaeological conservation communities are closely allied because conservation treatment is often the best opportunity for close examination of finds and extraction of samples for further analysis (Pye, 2001).

All of these activities contributed to the body of knowledge that accumulated and was selectively represented in the documentation records, with the intention of interpretation by the Curator and formal dissemination in the form of the archaeological report. This report was intended to include the Curator's catalogue of finds. Our aim during the fourth phase of documentation was to adapt the information from that catalogue for entry onto the CMS. We were not Anglo-Saxon scholars ourselves and did not aim to re-interpret the Curator's cataloguing. However, once the finds are accessioned the CMS entries are made available on the Museum's website and so are widely accessible and available for future scholarship.

4.2.4 The records and their provenance

Having described what we understood of the chronology of the excavation and documentation of the archaeological finds, and an overview of key contextual factors, the rest of the chapter describes the records that were created at each phase of documentation and what we understood of their origins, that is, their provenance.

In archival science, the core concept of provenance refers specifically to the original source of archival materials, whether that is an organisation, group or individual (Cook, 1992; Gilliland-Swetland, 2000). Therefore, a grasp of provenance requires an understanding of where a record came from. Where the management of digital records is concerned,

provenance metadata also includes subsequent owners and users of an information resource, or 'lineage' (Carata et al., 2014). Archivists and records managers seek to manage records so that they remain accessible and retrievable, and provenance is considered key to facilitating this. However, contextual information about the originator of records does not adequately convey the context in which records were created (Bearman and Lytle, 1985; Hurley, 1995). To this end, 'new provenance theory' requires consideration of function and activities, rather than being confined to organisational hierarchies and jurisdictions (Upward and McKemmish, 1994). Therefore, a broader view of provenance is adopted here, looking at the origins of the documentation records in terms of where, when and by whom they were created, and why.

4.3 Phase one: Excavation

There are only sparse details about the conditions under which the St Thomas cemetery was excavated and recorded (1969-1971). The paper published by the archaeologist in 1973 includes a brief description of the excavation and its documentation, referring to a specific table for recording grave structures that he devised and his rationale behind this. This was in addition to the 'grave plan, grave record sheet and skeleton report sheet' that he also refers to.[29] This is a strong indication that the archaeologist was responsible for the design of the recording methods. Further details are unknown since the archaeological report was not published and no other informal account was available. However, the provenance of the documentation records from this time can be inferred from the records

[29] This publication is not cited so as to maintain confidentiality.

themselves, and from likely archaeological practice for the excavation of burials (Barker, 1977; Brothwell, 1981).

4.3.1 Recording the graves: The grave records

There is no single standardised method for recording an archaeological site. Instead, different recording systems use different approaches to numbering, terminology and measuring, all at the discretion of the archaeologist. The design of the recording system is influenced by the research question (Renfrew and Bahn, 2005), the excavation technique (Drewett, 1999) and the conditions of the site (Barker, 1977). Furthermore, a flexible approach is preferable so that methods can adapt to changing conditions in the field (Drewett, 1999).[30] For the St Thomas excavation there was no indication that the recording system was influenced by or imposed by the funding body, DoE (for example, forms printed on headed notepaper).

While it is not possible to reconstruct the excavation process in detail, there are elements of the documentation record that could only have come from direct observation of the excavation. For example, each grave was photographed with the human remains in situ having been uncovered, and details are recorded such as dimensions of the graves, and

[30] Despite the professionalisation of archaeology in the UK since the 1980s, the standardisation of archaeological recording remains a controversial issue in the archaeological community (for example, see Carver, 2011). However, there is now a European standard that describes high-level principles (Perrin et al., 2014); practical guidance (Historic England, 2018; Stewart, 2013); and, more locally, specifications that align with the documentation practices of local museums and collecting organisations (for example, Brookes, 2017; Museum of London, 1994). The development of these standards and guidance aims to facilitate the long-term preservation of archaeological materials in an accessible way, and with better integration with museum information systems for public benefit in the long-term (Merriman and Swain, 1999; Perrin et al., 2014). The St Thomas excavation pre-dates these efforts by several decades.

condition of the soil. The archaeologist's paper from 1973 cites security concerns as well as time constraints that meant that graves were excavated and covered up again the same day. This meant that there was only one opportunity to document each grave.

The following account is from the published archaeological report of an Anglo-Saxon cemetery excavated in the 1950s, also a rescue archaeology excavation funded by DoE:

> *' ... a measured sketch was made of each grave, the position of objects being noted in relation to each other and to the skeleton. A vertical photograph was also taken of each grave, and the drawings were made by combining the information contained in both the sketch and the photograph. In an emergency excavation this method saves time which might otherwise be expended on a detailed and painstaking drawing in the field, and yet ensures that no details are lost regarding the appearance and position of the objects. Close-range vertical photographs of groups of objects were also of great use. The cleaning of objects in the grave for the purposes of photography was carried only as far as was possible without disturbing the objects in any way. Wherever practicable, finds were lifted still embedded in the earth immediately surrounding them. This is particularly necessary in the case of a complex of small objects such as may be found in a purse. The group can then be more conveniently excavated on a table in the shed than in the bottom of a grave, and a detailed drawing can then be made.'* (Evison, 1956, 86)

A further account of another rescue excavation of an Anglo-Saxon cemetery around the same time (but published much later) gives more detail about documentation:

> *' Each grave was excavated so that the bones and finds were exposed as far as possible but not moved. The plan of the grave was then drawn and vertical photographs taken. When the finds and bones were removed, occasionally other small objects which had been covered by the bones were revealed and added to the plan. It was always necessary to excavate a grave completely in one day because of the risk of interference at night. Some objects or groups of objects were removed in a block of earth for later excavation in a laboratory, e.g. the workbox in grave 107. On the completion of the excavation of each grave an index card was made the same day for each object found, recording the measurements and description of each find together with a measured sketch. In the various*

> *processes such as conservation which followed excavation there were many possibilities for confusion of objects to arise, and this prompt recording method proved invaluable in avoiding or disentangling subsequent confusion.'* (Evison, 1987, 13)

These brief descriptions of archaeological practice reflect the concerns of rescue archaeology and the need for timely documentation in potentially difficult circumstances, but also indicate the range of methods used to record the visual appearance of the excavation as well as salvaging and recording the excavated material. It is possible that the St Thomas excavation was documented in notebooks at the time and then written up at a later date. However, any site notebooks, if they existed, where not included in the assemblage of finds and documents acquired by the Museum. Instead, the main record of the excavation is a group of record sheets, referred to here as the 'grave records'.

There is no record of the actual excavation activities, but archaeological excavation in the open air, under tight time constraints, and in all weathers, is not conducive to the maintenance of neatly handwritten paper forms. While some of the hastily written forms may have been completed on site, the appended drawings were most likely drawn shortly after, and grave diagrams, drawn with considerable detail on graph paper, and with a viewpoint directly above the excavated grave, appear to be copied from the photographs of the graves, since the viewpoint and visible features match very accurately.

Each grave record consisted of loose sheets of foolscap paper stapled together, although these papers could have been sorted and stapled at a later date. The top sheet was a typewritten form filled in by hand, typically in pencil (occasionally in pen). The form was headed with the name of the excavation and year, with space to add the grave number, date and 'excavated by'. The names and initials indicated that the archaeologist had a team of

helpers. This is borne out by differing handwriting on the grave records, but also would have been a necessity given the limited time available for the excavation of the cemetery. The dates strongly indicate that information was entered on the date of excavation, or very close to that date.

The form was divided into three sections, each with several categories of information:

- The grave: length; breadth; depth; filling; dimensions and description of coffin traces; further remarks
- The skeleton: position; condition; sex; age; further remarks
- The grave goods: description; position; 1 to 9 (numbered list)

This format restricted what could be recorded to what would fit onto the sheet in the space allowed for each section. However, this did not seem problematic. Entries on these forms are brief notes, typically consisting of single words or phrases, with frequent use of abbreviations and notations such as brackets and ditto marks. Whenever there were more than nine finds in a grave, the form was annotated with additional numbers or continued onto a second sheet.

Other sheets consisted of drawings on graph paper, usually a diagram of the grave showing the layout of the human remains and indicating the locations where materials were found. Sometimes there were drawings of the finds themselves, also on graph paper. The detail and care apparent in these drawings are another indication that these records were completed after excavation, rather than on site.

4.3.2 Recording the finds: Numbering and labelling

There was a simple numbering system to identify the graves and the finds retrieved from those graves, which we assume was introduced by the archaeologist. Graves were individually numbered, most likely in a numerical sequence that reflected the order in which they were excavated. This logical assumption is supported by the dates on the grave forms where the sequence of grave numbers correlated with the sequence of dates. Each find that was retrieved from a grave was entered onto the numbered list on the grave record. From that point on, the number (referred to here as the 'excavation number') was used to identify the find. In later documentation, the excavation number was typically noted as 97(7), where 97 refers to the grave, and 7 refers to the numbered find. Each find could therefore be identified by a unique number. For example, in Figure 6, beads that were found in the neck area of the skeleton were numbered individually and their position noted in the drawing.

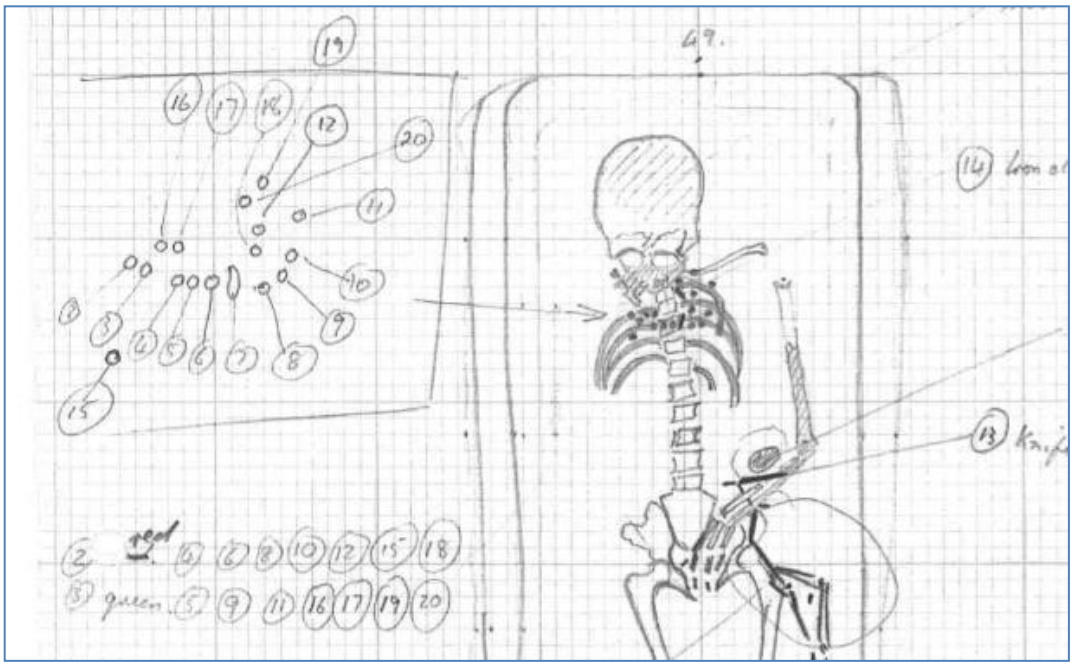


Figure 6: Detail from grave drawing for grave 94.

In addition, each find was assigned an 'SF' ('small' or 'special' finds) number, a single numerical sequence for all finds from the entire site. An SF number is typically used to distinguish between small finds and other material such as the vast quantities of animal bone, flint chippings or pottery fragments that may be found at archaeological sites and collected in bulk (Barker, 1977; Historic England, 2018). However, at St Thomas, the SF numbers do not appear on the grave records, and it is not clear when they were first introduced. Surviving correspondence refers to a 'small finds book' which indicates that a separate register of finds was maintained, but I did not find this book with the associated documents at Museum A. SF numbers were used on some but not all of the subsequent records, but the main form of identification was the excavation number which was used extensively in correspondence and documents.

The excavation numbers needed to be physically associated with the finds. This was particularly important since many of the finds were similar or lacked distinctive features. Archaeological material with a firm, stable surface (such as pottery) can be labelled by writing the number on the surface (Barker, 1977). However, this was not possible with the majority of finds from St Thomas because they were too small and often had a bumpy or friable surface. It would not have been possible to attach a label to them either, due to the fragility of the archaeological material.

While the details of the labelling of the finds are not known, it was recommended practice to store excavated finds in individual plastic bags with the number written on the bag (ibid). Specimen bags, resealable and made of plastic, were both durable, waterproof and clear so that the contents would be visible, and we found some such bags tucked in with finds. It therefore seems likely that finds were initially bagged, and at a later date were rehoused

with paper labels. At the time of accessioning, each find had its own label, consistent in size and shape (Figure 7). It is not clear when the labels were introduced or who wrote them, but a variety of handwriting and writing implements are apparent, which strongly suggests that several individuals were involved. This is also suggested by inconsistencies in the notation on the labels, with the name of the site ('St Thomas'), the SF number, and name (such as, 'knife') sometimes included with the excavation number. However, while the origins of the labels in uncertain, they served a vital purpose because the plastic specimen bags were typically not retained, so the labels were the primary means for identifying the excavation number of each find.

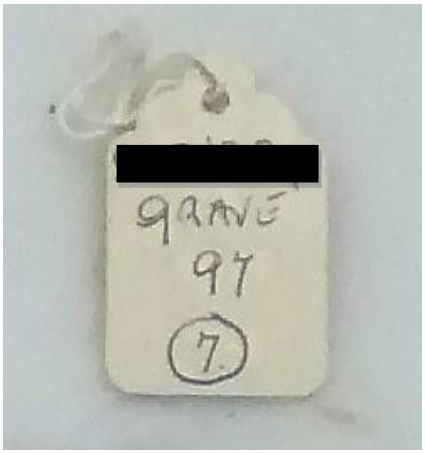


Figure 7: Label for find 7 from grave 97. Length approx. 2.5cm. The name of the site is obscured for confidentiality.

4.3.3 Provenance of the grave records and labels

The documentation created at the time of the excavation, or shortly after, constituted the primary record of the archaeological site. The records were created to enable reconstruction of the site by future scholars, and this documentation, along with the physical material that was retrieved from the site, are now all that remains of the St Thomas cemetery which has since been destroyed by bulldozers. While we cannot be certain about the details of the excavation, it is apparent that the excavation was carried out by a team, led by the

Archaeologist. A standardised form was used to record selected information about each grave, filled in by the Archaeologist and members of his team. This was done at the time of excavation, or soon after.

The use of a standardised form and the brevity of entries point to a pragmatic approach to recording, which was likely to have been in response to the time constraints imposed on the team by the exposed site and pressing need to complete the excavation so that demolition could resume. These time constraints meant that the recording method needed to be quick and easy, and the form had been designed to be highly selective about what was recorded. There are also indications that the excavation was carried out in keeping with expected archaeological practice at that time, such as the apparent use of specimen bags, SF numbers, and photography of human remains and finds in situ.

4.4 Phase two: Entry to Museum A

The use of index cards to record archaeological finds was a common method in archaeological practice and in museums, where they were often referred to as 'finds cards' and 'record cards' (Barker, 1977; Cronyn, 1990).[31] During my fieldwork at Museum A, I saw card indexes in use in other curatorial departments to record archaeological finds. So,

31 The use of cards for indexing and cataloguing has long been common in libraries and museums (Bearman, 2008; Braithwaite, 1978; Dudley and Wilkinson, 1979). Recognition of the great practical utility of using individual cards is thought to have originated with Linnaeus in the 18th century (Müller-Wille and Charmantier, 2012). By the mid-19th century cards were widely used for library catalogues, and this was taken to extremes in the late 19th century by Paul Otlet who aimed to catalogue all human knowledge in index cards (Wright, 2014).

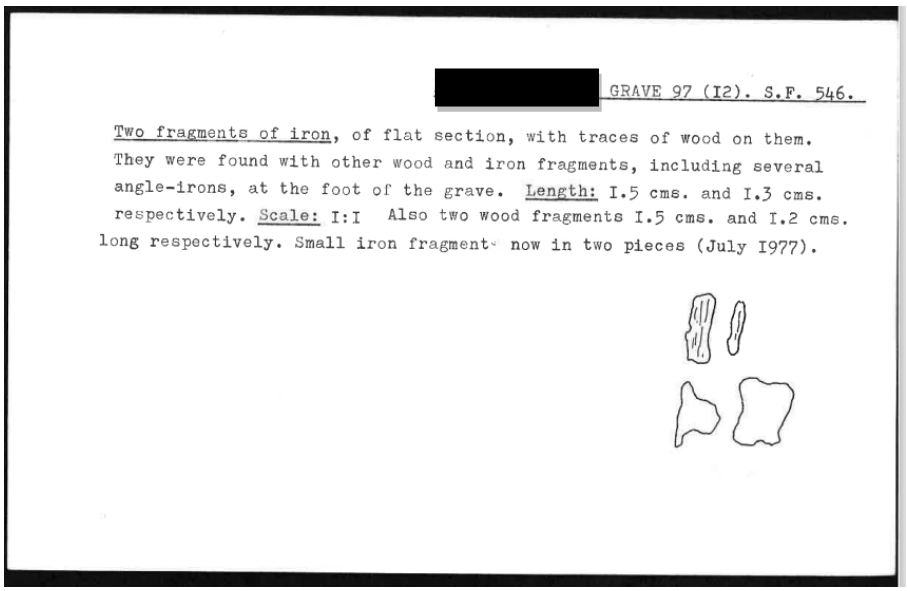
while specific details about the creation of the card index are not known, it was a familiar way to process finds, post-excavation.

4.4.1 Post-excavation processing: The card index

We understood little of the creation of the card index because it was not mentioned in the associated correspondence and documents at Museum A. However, the card index is a flexible format since cards can be rearranged or selectively retrieved, and new information can be added to individual cards or inserted into the whole (Barker, 1977). So while the purpose of the St Thomas card index was not explicitly made clear in any of the associated papers, the format had clear advantages over notebooks and was an established form of finds record for archaeology and museums – part of the 'sorting and tidying up' (Grinsell et al., 1974, 62) that was part of the post-excavation process. The card index established an ordered system for collating basic information concerning the finds and provided a resource for their future study.

The cards (referred to from now on as 'finds cards') were consistent in size and format (5 x 8 inches, plain), and were typed. The information on the finds cards was consistent in content and arrangement. Each card was headed by the name of the archaeological site, excavation number and SF number. The typed text included the object name, brief text description (including material, for example, iron, silver, glass), and location where it was found, followed by dimensions. Many, but not all, had a hand-drawn outline of the shape of the find. Sometimes there were additional details about associated finds, or physical condition if the find had fragmented or was fragile. Some had additional sheets stapled to the card, others had handwritten annotations. There was typically one find per card (Figure

8). The finds cards were stored together in numerical order by excavation number with cards for each grave separated by dividers.


[redacted] GRAVE 97 (I2). S.F. 546.

Two fragments of iron, of flat section, with traces of wood on them. They were found with other wood and iron fragments, including several angle-irons, at the foot of the grave. Length: I.5 cms. and I.3 cms. respectively. Scale: I:I Also two wood fragments I.5 cms. and I.2 cms. long respectively. Small iron fragment now in two pieces (July I977).

Figure 8: Finds card for find 12 from grave 97. The name of the site is obscured for confidentiality.

The card index was not dated; however, dates were mentioned very occasionally in typed comments on the cards. For example, on the card for 97(12) (Figure 8):

> **Small iron fragment now in two pieces (July 1977).**

This indicates that the card index was being created around the late 1970s, which would fit with the timing of post-excavation processing of the finds. Other cards mention later dates, for example on the card for 161(14):

> **(14) is listed on the plan as an angle-iron, but there was no object no (14) when the contents of the box were checked in Feb. 82.**

This later date was after the St Thomas assemblage was acquired by Museum A, suggesting that work on the card index started before acquisition and continued after the finds moved to the Museum.

It is apparent from comments on the finds cards, when seen alongside the descriptions of some of the finds, that the card index was created before many of the finds had been conserved. This also fits with the timing of acquisition since the majority of finds were conserved after the group was moved to Museum A. This is supported by later handwritten annotations on some cards that read 'conserved', and the presence of receipt slips from Museum A's conservation department stapled to some cards.

There was no named individual associated with card index. The finds cards were not signed or initialled, so we do not know who created them. Since the cards were typed and not handwritten, we do not know how many individuals were involved. However, the nature and wording of comments regarding appearance and condition suggest that some archaeological knowledge and experience was needed, for example, the description of glass fragments as 'with white marvered trail' required knowledge of glass making and the competence to identify the technique.[32]

Similarly, the ability to distinguish between corroded archaeological iron and bronze, and the use of technical terms and phrases suggested familiarity with archaeological materials

[32] Description quoted from finds card for find 18 from grave 135.

and modes of description. Given the likely timing of the creation of the card index, is it highly likely that the Museum A Curator was involved in its creation, if not the sole creator. However, this cannot be confirmed.

4.4.2 Provenance of the card index

Details of the provenance of the card index are uncertain. However, it was created as a complete record of all finds that were retrieved from the archaeological site and would have been part of the post-excavation processing of the finds. The resulting information resource was a documentation record focused exclusively on the group of finds, providing basic information in a structured, easily accessible format. While the grave record established the identification numbers and names for the finds, the card index provided more details on their physical appearance, where they were found, and sometimes their condition. This formed the basis for further study and interpretation. An approximate chronology places the creation of the card index around the time of acquisition of the St Thomas materials by Museum A, in the late 1970s and early 1980s. It is not clear who created the card index, although some archaeological expertise is evident, and it is possible that the cards were created by the Curator who went on to compile the Catalogue.

4.5 Phase three: Publication

Archaeologists were expected to publicly disseminate their findings, the intention being that other scholars should have access to all information necessary to be able to reinterpret

the site (Drewett, 1999; Grinsell et al., 1974).[33] For the St Thomas site, this included a full catalogue of finds, and illustrations of each find. Every find from the site was catalogued and was drawn by a professional artist, resulting in two further complete records of the finds. The catalogue and the illustrations are discussed separately.

4.5.1 Curatorial interpretation: The catalogue

Correspondence shows that discussion about the publication of the archaeological report started soon after the excavation was completed. It was eventually agreed that the Archaeologist would pass responsibility for the publication to the Curator at Museum A, who had herself been involved with the original excavation. The catalogue was not dated, and precise timing of her cataloguing work was not known, but the Curator compiled the catalogue after all conservation treatment and analysis was completed. This suggested a date range of late 1980s to early 1990s. It was most likely complete by the time the AnSax online database was being compiled in 1999/2000.

The catalogue existed in two versions: a typed paper copy housed in a ring binder, and a spreadsheet. The spreadsheet was created in preparation for inclusion in the AnSax online database. Direct comparison between the typed catalogue and the spreadsheet showed that the information had been transferred to the digital format unchanged. During the

[33] By the time Grinsell et al published the second edition of their guide on archaeological reports in 1974, the challenges of publishing archaeological data in full was already regarded as an imminent crisis, mainly due to vast quantities of data and material being retrieved from increasing numbers of archaeological sites and the costs of publication (Grinsell et al., 1974). By the 1990s, when the Museum A Curator was preparing her publication, the crisis was burgeoning, (Thomas, 1991).

accessioning process we used catalogue information from the spreadsheet exclusively, and did not refer to the paper copy, therefore only the spreadsheet version is discussed here.

The catalogue was a full list of all graves, and all finds from the graves (graves which had no finds were also listed). The types of information listed for each find was the same as on the card index: name, description including material, dimensions, location of the find in the grave. In the spreadsheet, the finds were listed in separate rows, and the types of information were separated out into different columns, for example, name, material and description were in different columns, whereas on the finds card this would have been a single sentence. Where more than one material was present these were listed separately as 'material 1' and 'material 2'. Similarly, length, width and height were listed separately. While the types of information were repeated, the information content was revised because information on the card index would have become out of date once the finds had been conserved and their appearance changed. The card index had also not been updated to include the results of scientific analysis (such as the identification of traces of wood).

Significantly, the catalogue was an opportunity for the Curator to disseminate her interpretation of the finds. This record therefore not only lists the finds but also represents the Curator's authoritative view on what they were and their possible significance. Most likely, the main body of the publication would have reported on specific aspects of the graves and human remains, with specialist reports on particular finds such as jewellery and weaponry. The full catalogue of the graves and their contents would be included at the end. An archaeological report by Evison (1987) describes the rescue excavation of an Anglo-Saxon cemetery in the 1950s and follows this format. However, since the St Thomas site

was over twice the size of Evison's (which had 165 graves, compared with 388 at St Thomas), the catalogue could have been included as an appendix, possibly on microfiche.

4.5.2 The illustrations

The creation of illustrations for publication was referred to frequently in the surviving correspondence, since this was one aspect of the preparation for publication that incurred a quantifiable financial cost, a cost that was borne by DoE (later known as English Heritage). The publication would most likely have included an illustration of each find, arranged by grave, at the end of the report with the catalogue. As with the complete catalogue, the illustrations gave scholars access to information on the finds as a substitution for access to the finds themselves. In Evison's report (1987) over 80 pages were taken up with illustrations.

The correspondence at Museum A was incomplete, but some of the individual artists were named, along with the dates when they worked on the St Thomas material. One of the artists, who was working in a freelance capacity, provided detailed notes of which finds he drew in the form of a card index, and this was kept with the associated papers at Museum A. The creation of illustrations for publication started soon after excavation in the 1970s when the most vulnerable finds were conserved by AML. These illustrations, created by DoE's in-house drawing team, were not dated but copies were attached to the relevant finds cards, which suggests that they pre-dated the creation of the card index. According to correspondence, illustration work continued into the 1980s with the addition of the freelancer. It is also apparent from the correspondence and associated documents that the finds were despatched to the artists in batches, and returned after illustration work was

complete. At Museum A, the original illustrations were stored with the grave records (Figure 9).



Figure 9: Some of the illustrations of finds from grave 161.

Each drawing was annotated with the excavation number of the find and sometimes the SF number. Sometimes additional information was added such as the name of the archaeological site, the material (for example 'bronze') and an object name. The illustrations were typically drawn at 1:1 scale, and were labelled as such, although larger finds were drawn at 2:1 scale.

In rare instances, the artists signed their name. However, it was apparent from comparing the handwriting, signatures and style of the drawings that different artists had created illustrations, and some finds had been drawn more than once. Figure 10 shows three visual representations of find 97(8) for comparison. The first (a) is a digital photograph, taken at the time of accessioning, and images (b) and (c) are both illustrations created by different artists. The first drawing (b) conveys the uneven texture of the find in detail, using a variety

of lines, dots and shading, while the other (c) has a minimal use of line to depict the shape and surface contours of the object, a more interpretive representation of the find's morphology.

(a)  (b)  (c) 

Figure 10: Find 8 from grave 97: (a) photograph from time of accessioning; (b) and (c) illustrations in two different styles. Length 2.6cm.

It was apparent from incomplete correspondence at Museum A that there was a clear preference for the sparse, interpretative style shown in 10(c), and this resulted in several illustrations being redrawn. This style was the long-standing approach of the artists in the drawing team at DoE: a strict and spare use of line, and avoidance of other mark-making including stipple and cross-hatching (Dobie, 2003).[34] Not only was this style already well-established and expected in archaeological literature, but also some illustrations of St Thomas finds had already been drawn by the DoE artists, work which started in the 1970s.

[34] Dobie, who was an artist in the Drawing Office at DoE, describes the style as 'evolved from 19th century engravings and British Museum catalogue drawings via Elizabeth Meikle, David Neal and then very influentially Frank Gardiner' (Dobie, 2003,4). According to her account, at its peak, up to 13 artists made up the team, all adopting the same house style. They worked almost exclusively on small finds which were passed to them from AML having been X-Rayed and conserved (ibid).

The drawings that were more detailed and textured, such as 10b, were redrawn so that the illustrations in the publication would be consistent in style.

4.5.3 Provenance of the Catalogue and illustrations

The provenance of the catalogue and the illustrations was relatively well understood, compared to the other documentation records. A rough chronology places the cataloguing work after conservation and analysis were complete but before the publication of data on the AnSax database. The timing of the illustrations can be roughly reconstructed from correspondence, including redrawing of some finds so that all illustrations were in a consistent style. The purpose of the records was also clear because both the catalogue and illustrations were intended for publication in the archaeological report. This publication would have been the authoritative, publicly available record of the finds from the St Thomas excavation. It is also clear that the Curator was responsible for the catalogue, while the illustrations were the work of professional artists, some of whom are named in correspondence. However, it is not clear how many artists produced illustrations since only some of the drawings were signed, and also several artists could have worked using the same style. Some finds were drawn more than once, but this could have been done by the same artist, in two different styles.

4.6 Chapter summary

Our understanding of the chronology of the St Thomas excavation and documentation of the finds was incomplete, but we were able to construct a rough chronology of the documentation work post-excavation and since acquisition at Museum A. Our understanding of the provenance of the documentation records described in this chapter encompasses not just where, when and by whom they were created (as far as we were

aware), but also why. While some of this contextual information was gleaned from associated documents at Museum A such as correspondence, we also inferred contextual information from the records themselves, from the content but also physical characteristics, and applied our understanding of museum and archaeological practice. Three key contextual factors regarding the museum context were important factors in shaping the records and their content: the decay of the archaeological material, conservation interventions, and activities around the development of scholarship of the finds. Our understanding of the records and their provenance is summarised in Table 5.

	Phase one: Excavation	**Phase Two: Entry to Museum A**	**Phase Three: Publication**	
What	Grave records Typed paper forms filled in by hand, sometimes with hand-drawn diagrams and drawings	Card index Typed index cards with some hand-drawn line drawings	Catalogue Spreadsheet (pre-publication version)	Illustrations Pen and ink drawings
When	1969 to 1971 At the time of excavation or shortly after	Late 1970s to early 1980s Post-excavation and shortly after entry to Museum A	1980s and 1990s After completion of conservation work	1970s to 1990s Post-excavation and until 1990s
Where	On site or shortly after, external to Museum A	External to Museum A, and at Museum A	At Museum A	External to Museum A
Who	Archaeologist and his team	Curatorial staff at Museum A	Curator	Professional artists
Why	To facilitate study and interpretation of the site. For use by researchers, most likely archaeological community.	To facilitate study and care of the finds. For use by curatorial staff at Museum A.	For publication in the archaeological report, to disseminate archaeological outcomes of the excavation. For use by archaeological community; stakeholders such as funding bodies; amateur groups such as students and wider public.	

Table 5: Summary of our understanding of the records and their provenance.

5 Aspects of routine

The preceding chapter introduced the St Thomas finds and addressed what we understood of the provenance of the St Thomas documentation records: that is, where they came from and why they were created. This chapter addresses what we could infer about how the information content was created.

It was highly likely that the task to create the St Thomas records involved routine action. Not only had I experienced documentation as a recurrent pattern of action, but also the consistent structure of the St Thomas documentation records attested to the consistency of the task that created them. The documentation records all recorded information on the St Thomas finds in a systematic, structured way, recording much the same types of information (Table 6). This suggested that the records were created in a systematic way, using recurrent patterns of action that are characteristic of a routine. Differences in the circumstances in which each set of records was created would result in different records even if the ostensive routine was the same.

Type of information	Grave records	Card index	Catalogue
Excavation number	X	X	
Name	X	X	X
Text description		X	X
Position in grave	X	X	X
Dimensions		X	X

Table 6: Summary of the information content common to the records.

Assuming this supposition was correct, understanding the creation of the records would require an understanding of the documentation routine and what this routine involved. The difficulty in understanding the documentation routine was that the St Thomas records were

created decades ago, there were no written accounts of how the records were created, and the individuals involved had long since departed Museum A. However, the routine to create these records was likely to be akin to the one that we used for accessioning, which was itself a documentation task.

The sequential steps in accessioning consisted of: identify the find, verify its identity and then record the required information (Figure 2, Section 3.6.1 and Table 2, Section 3.7). Understanding the final step, when information was actually recorded, was key to understanding where the information content came from. While it was not possible to reconstruct the whole routine, by discerning patterns in the variations between the records, it was possible to infer the underlying patterns of action that shaped the content. So, while the documentation routine was not known, these aspects of the routine were apparent and facilitated our use of the records.

5.1 Sources of information

Since the purpose of these records was the documentation of the St Thomas finds, it was expected that the main source of information would be the finds themselves, or rather, observations of the finds. For example, it was highly likely that the finds were consulted when recording 1:1 scale line drawings on the finds cards, or obtaining dimensions measured to the nearest millimetre on the catalogue. However, there were indications that the records were created with reference to other sources as well.

For example, as discussed in the preceding chapter, information in the grave record may have been copied from site notebooks, rather than actually recorded on site, despite being the surviving primary evidence of the archaeological site (Section 4.3.1). In other

documentation records, explicit reference to preceding records made it clear that these were used as sources. For example, on the finds cards, comments occasionally referred to the 'grave plan' or 'plan', which indicated that the grave records were used in the creation of the card index.[35] However, apart from occasional explicit mention of other sources, and observations that came from the actual finds, the use of other sources of information in the creation of the documentation records remained uncertain. For example, it was possible that other notes and records existed that did not survive or were personal documents of curatorial staff.

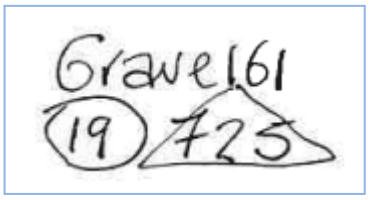
The aspects of routine that are described here represent our broad understanding of some of the processes involved in the creation of the sets of documentation records. We developed an understanding of these processes while trying to explain the differences between the records. These differences were the key starting point from which we constructed an understanding of where the information content came from. This is not to say that we knew how the records were created. The actual documentation routine to create the records remains unknown, for example, it would be erroneous to assume that a record was created by revising content from a preceding record. However, understanding elements of these processes helped us explain how the information content of the records was shaped, and thereby explain the differences between them.

[35] For example, on the finds card for find 32 from grave 161.

5.2 Transfer

Where information was consistently duplicated from one record to another this suggested a process of transfer or copying. When comparing the different sets of records, there were instances of information being repeated on different records, but these instances were not consistent enough to indicate that information was being routinely transferred. This indicated that either information was recorded anew or was taken from another source and revised in some way (which may have involved other intermediate records and documents). This in turn implied that, with each phase of documentation, the creation of a new record required the effortful application of discretion and competence.

There was, however, a significant type of information that was consistently reused and duplicated between records: the excavation number. This identification number was introduced in the grave records and then used for identification of the finds on the labels, the card index and the illustrations. Even then, the precise notation varied depending on whether it was typed or handwritten (Figure 11), so the duplication was not entirely like for like.

(a) 

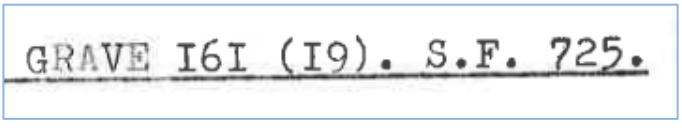
(b) 

Figure 11: Identification numbers for find 19 from grave 161: (a) on illustration; (b) on finds card.

In Figure 11, the SF number is also used (written in a triangle or prefixed with S.F.), but it is notable that the excavation number was used most consistently in the documentation records in preference to any other identification number. The alternative numbering system of SF numbers appear to have been preferred by the Curator, the advantage being its simplicity, since the SF number is a single numerical sequence. However, not all finds were assigned SF numbers and the reasons for this were not clear.

Other numbering systems were also used in association with the St Thomas finds. These referred to related artefacts or records, for example, numbers referring to X-rays, photographs, drawings or conservation records. There were potentially multiple conservation numbers because each conservation studio or lab would have had their own system for recording treatments. However, not every find would have been included in these associated numbering systems. Only the excavation number was comprehensive enough to identify every find from the St Thomas site. Furthermore, the excavation number was both simple and intuitive since it referred to only two elements: the grave and the find. It seems to have remained the main form of identification until the Curator introduced a new numbering system in the catalogue.

5.3 Packaging

Packaging aimed to facilitate future use by deliberately shaping the information content (Bannon and Bødker, 1997; Hertzum, 1999; Markus, 2001). Packaging was therefore aligned with provenance, that is, each set of documentation records was created for a particular purpose and aimed at specific users, and the information content was packaged to meet the needs of those users (Section 4.2.4). Purpose changed with each phase of documentation, and so with each phase the information content was repackaged. The

activities of packaging were apparent in the omission of some types of information and the addition of others; and also, superficial revisions to the text to adjust wording, syntax and format.

5.3.1 Additions and omissions

The omission of some types of information and addition of others was particularly notable when comparing the grave records with the card index. While the grave records aimed to document the excavation event, recording information about the graves, the human remains and the finds, the card index focused on facilitating the identification and study of the finds. Consequently, the finds cards did not include any information from the grave records concerning the human remains or the conditions of the grave site, such as soil or orientation, but did include descriptions, dimensions and drawings of the finds. This was a reflection of the anticipated use of the record specifically for identification and study of the finds, rather than a broader archaeological record. This highly selective approach to documentation meant that the intended users of the record would not have to sort through information that was not relevant to them, and example of the removal of contextual information in order to improve the mobility of an information resource (Markus, 2001).

5.3.2 Syntax

When comparing the information in the catalogue with the card index, the records were noticeably shorter. Again, this could be understood as packaging to meet a particular purpose and the requirements of intended users. The catalogue information was condensed down to convey only basic details, so the information was more readily accessible to a user who was familiar with this style of representation. For example, Figure 12 shows an extract

from a catalogue published in an archaeological report of an Anglo-Saxon cemetery that was excavated in the 1950s (Evison, 1987).[36]

GRAVE 63 (Figures 36, 73) M, 30-45. 72.5°.
7ft x 2ft (2.13m x 0.61m)
Skull partly displaced, hands on top of femurs.
1. *Spearhead*, leaf-shaped blade, solid shaft, split socket, L 34cm. Left of skull.
2. *Knife*, angled back, remains of wooden grip, L 16.2cm. At left hip.
3. Oval *iron buckle loop* with tongue, width 3.8cm. Mid waist.
4. Two shapeless *iron rust lumps*. Outside left knee.

Figure 12: Extract from the catalogue of finds in an archaeological report (Evison, 1987, 234).

Condensed entries would also have meant that the catalogue would take up less pages in the publication. As seen in Figure 12, the syntax is reduced to short phrases rather than full sentences. Furthermore, there is no exposition, and any comments concerning the condition of finds, speculation of their associations or identification, were included in the main body of the report. In the archaeological report that Figure 12 was extracted from, the catalogue of 165 graves and nearly 800 finds was laid out in two columns, single spaced, and yet still occupied 40 pages, which, when combined with over 80 pages of illustrations, accounted for nearly 30% of the whole publication (ibid). The brevity of catalogue entries and removal of extraneous information was not only in the interests of clarity and consistency for the benefit of the researcher but would also have kept costs down – a matter of great

[36] Comparable published catalogues in archaeological reports can be found in Audouy and Chapman (2009); Green and Rogerson (1978); Hutchinson (1966).

concern for the archaeological community (Grinsell et al., 1974). The same terse approach was adopted in the St Thomas catalogue, where the sentences were truncated. This can be seen clearly when comparing descriptions of the position in the grave that the find was discovered, and physical descriptions of the finds (Table 7).

Excavation number	Type of information	Card index	Catalogue
134(5)	Position in grave	They were found just below the neck.	below neck
135(2)	Position in grave	It was found inside the left elbow, tang pointing towards the foot of the grave.	inside left forearm
161(16)	Description	Tongue-shaped piece of iron, slightly curved at one end, of flat section, with substantial traces of wood of vertical grain on the underside, being part of mount for a wooden box.	tongue-shaped, remains of rivet hole at curved end. Mineralised wood on underside
161(9)	Description	Bronze ring-binding, consisting of a narrow strip of metal formed into a circle. Which is narrower at the top than at the base, pierced by four rivets, set at equal points around the inside of the strip. Two of the rivets have small disc-shaped heads, and shanks of circular section, the other two are smaller with curved shanks. This binding was presumably attached to wood or leather which has disappeared.	ring-shaped binding, flat section, formed of a narrow strip, secured by disc-headed, circular section rivet. Similar rivet pierces opposite side of the ring, which has 2x curved hooks for attachment along inner edge

Table 7: Comparison of descriptive texts showing the brevity of the catalogue.

5.3.3 Terminology

Packaging can also be seen in the Curator's choice of terminology suited to an archaeological publication and the archaeological community when compiling the catalogue, for example, wording such as 'bifurcated', 'cabochon' and 'quadrantal', or the use of 'copper alloy' instead of 'bronze' (Table 8).[37] However, this could result in more lengthy

[37] In archaeological publication, 'copper alloy' was the more appropriate term, as explained by Cronyn:

descriptions, in contrast to the Curator's efforts to compile condensed catalogue entries. The use of more specialist terminology was an example of the curator reinforcing boundaries and identity through language since it signals her understanding of the archaeological lexicon while potentially excluding those from non-archaeological groups. This can therefore be seen as an example of the 'controlling and patrolling' of boundaries (Brown and Duguid, 1996).

Excavation number	Card index	Catalogue
134(7)	Pair of iron shears, in three pieces.	Shears; iron; pair of shears, straight back, curved cutting edge.
135(7)	A piece of leather with a similar mount turned upside down and adhering to it.	Leather frag with part of similar mount attached by square-headed copper alloy rivet with bifurcated shank
135(17)	Semi-circular amber bead, pierced longitudinally.	Amber bead; roughly shaped, quadrantal, longitudinal perforation
135(22)	Mass of leather pierced by a silver rivet with domed head.	Leather frag, in the form of equal-armed cross with expanded terminals, centrally pierced by square-headed, copper alloy rivet with bifurcated shank

Table 8: Comparison of descriptive texts showing differing terminology.

5.4 Updating

Records needed to be updated when the finds themselves changed, or to add new information to the record. This was apparent in differences between the records that were sometimes substantial.

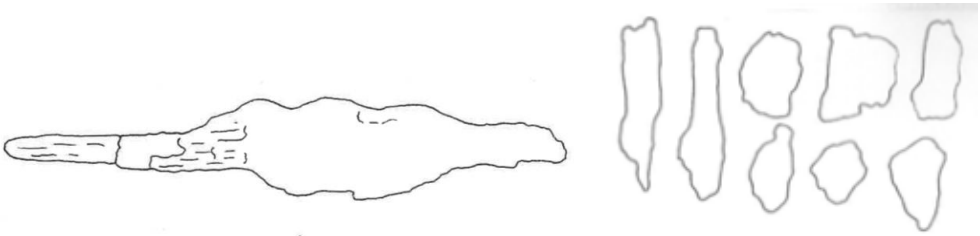
Since it is impossible to gauge the exact make-up of copper alloys without analysis, in the absence of this it is essential that the alloys are referred to by the generic name of 'copper alloy' rather than by a specific, unproven, prejudicial term such as 'bronze' (Cronyn, 1990, 213)

5.4.1 Changes due to conservation and decay

Updating was needed due to the influence of two key contextual factors, discussed in Chapter 4: the decay of archaeological material, and its conservation (Section 4.2.1 and Section 4.2.2). If the documentation records were to successfully function as aids for identification of the finds the information needed to be up to date. However, as soon as a find changed, for example when it disintegrated, or when multiple pieces were joined during conservation treatment, the information in the documentation record was rendered obsolete. This was significant because the identification of finds rested not only the use of the identification numbering and labelling, but also the description of the finds' physical appearance. This description was represented in text, dimensions, in line drawings on the finds cards, and in the professionally drawn illustrations. Recording up-to-date information in the documentation record was therefore a key part of the documentation routine.

The impact of conservation treatment could be considerable. Figure 13 shows the appearance of find 1 from grave 97, a knife, before and after conservation treatment, while Table 9 compares the associated text descriptions and dimensions from the finds card and the catalogue entry. When comparing the descriptive information not only are the drawings dramatically different, but also, the text description and dimensions do not match. It is therefore not obvious that these two records refer to the same find.

(a)



(b)

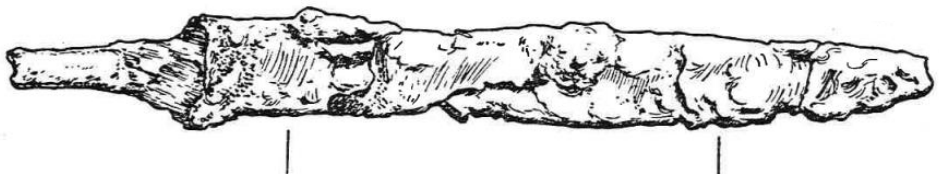


Figure 13: Find 1 from grave 97: (a) Line drawing from finds card; (b) illustration.

Type of information	Finds card	Catalogue
Description	Iron knife, in two pieces, plus eight fragments of the lower half of the knife blade which has disintegrated since it was excavated. The tang and the upper portion of the blade have substantial traces of wood of vertical grain.	Knife; iron, horn, leather; curved back, straight cutting edge. Traces of leather sheath with possible grain pattern on blade, mineralised remains of horn handle on tang.
Dimensions	Length of two main pieces: 12.7cm	Length 17.5cm

Table 9: Description and dimensions of find 1 from grave 97 from the finds card and catalogue.

5.4.2 Addition of new information

Records were updated to add new information that resulted from study and scientific analysis, this aspect of updating therefore related to the contextual factor of scholarship, discussed previously (Section 4.2.3). In the previous example (Table 9), the description changed from 'substantial traces of wood' on the finds card, to 'mineralised remains of horn handle' in the catalogue. This is a substantive change in understanding of the physical material that would have required strong magnification to examine the morphology of the

surface to detect and identify mineralised organic remains (Cronyn, 1990). Similarly, examination of corroded iron identified mineralised wood identified as beech (for example, find 10 from grave 97), which would have required a scanning electron microscope and specialist expertise (ibid). In other instances, a find identified as bronze on the finds card was identified as silver on the catalogue (find 3 from grave 135), resulting in differences between the information on the finds card and the catalogue.

5.5 Interpretation

The act of documenting the finds was always interpretive because it involved creating a representation of observations of the find. The differing styles of drawing show how a different interpretation of visual appearance could result in a very different product. Obtaining measurements involved decisions about which dimension to measure and what identifier to use to describe that measurement, that is, length, width, height, diameter. However, some acts of documentation were more interpretive than others, and the term is used here to refer to interpretive acts that explicitly aimed to answer the question 'what is it?' or attempted to infer the associations between finds. This therefore relates to the contextual factor of scholarship, discussed in the preceding chapter (Section 4.2.3). These acts of interpretation resulted in substantive differences between the records that represented a different view of their significance, value or meaning. However, there were patterns in these differences when the underlying rationale was consistent.

5.5.1 Naming

The first act of interpretation was at the time of excavation when the archaeologist distinguished between an archaeological find worth preserving and debris from the ground. Later, the archaeologist interpreted the find further when allocating a name and identifying

the material, even if the name was 'fragment of iron'. The naming of finds was an interpretive act because by recording a retrieved object as 'knife' immediately associated the find with assumptions about previous shape (since the majority of finds were severely decayed), mode of use and potential meaning. The name 'knife' also reflected the specialist expertise of the archaeologist, because they used a variety of words to describe metal bladed finds, including 'spearhead' and 'shears', thereby applying judgement to select which name to use. Finds which were well preserved and readily recognisable were assigned similarly specific names such as the 'tweezers', 'buckle', 'ring', and 'bead' (for example, see finds depicted in Figure 14). These names tended to be consistent across the phases of documentation.

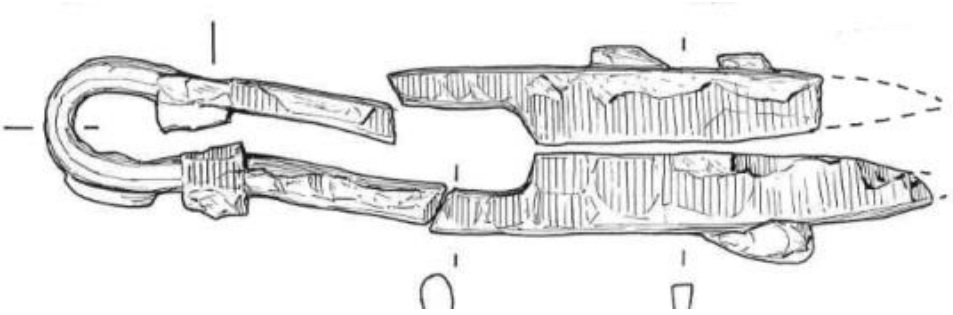
However, the majority of finds were fragmentary and sometimes heavily corroded, and in some cases the features would only be apparent after conservation work. Most finds in the grave record were therefore assigned less specific names that alluded to the shape of the find without being specific about possible former function. This included names such as 'stud', 'clip' or 'mount'. For finds with few identifiable features, vague terms were used, most commonly, 'frag' or 'frags' (abbreviation of 'fragments'), although these were often qualified with descriptors, for example 'L-shaped frag'.

In later records, the card index and the catalogue, slightly more specific names were often used to reflect changes in the interpretation of these finds. Table 10 compares names from the three records. The first example, find 15 from grave 161, reflects increasing clarity in the naming, from 'frag' to the suggested function of 'box-fitting', to 'hinge' in the catalogue. In the second example, find 20 from grave 97, 'frags' is revised to 'tongue-shaped piece', and then revised further to 'strip'. In the third example, the tentative naming '?binding' on

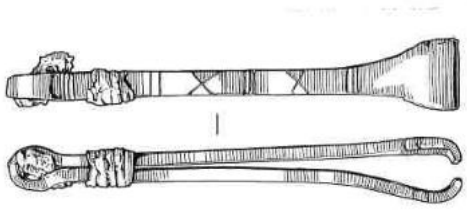
the finds card has been clarified as 'rim mount' in the Catalogue. In the fourth example, the find described as a 'ring' in the grave record is named as a 'ring-binding' on the finds card and then as a 'binding' in the catalogue. Figure 15 shows drawings of these four finds, showing that the shape of each find is suggestive but less distinctive than the finds in Figure 14.



(a) Find 1 from grave 135; buckle. Length 2.8cm.



(b) Find 7 from grave 134; shears. Length 13.8cm.

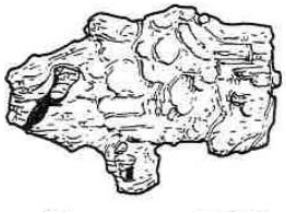


(c) Find 5 from grave 135; tweezers. Length 7.0cm.

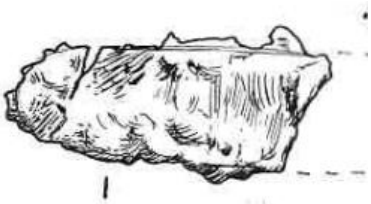
Figure 14: Three distinctive finds: (a) buckle; (b) shears; (c) tweezers.

Excavation number	Grave record	Card index	Catalogue
161(15)	Iron L-shaped frag	Fragment of box-fitting	Hinge frag
97(20)	Frags of iron mounts of wooden obj.	Tongue-shaped piece of iron	Strip
97(4)	Bronze obj.	Bronze ?binding	Rim mount
161(9)	Br. ring	Bronze ring-binding	Binding

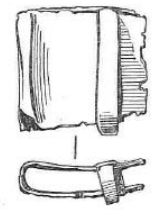
Table 10: The naming of finds in the grave record, card index and catalogue.



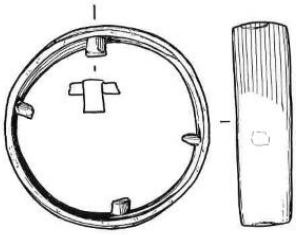
(a) 161(15). Length 3.8cm



(b) 97(20). Length 4.0cm



(c) 97(4). Length 1.6cm



(d) 161(9). Length 3.0cm

Figure 15: Illustrations of the four finds listed in Table 10: (a) hinge frag; (b) strip; (c) rim mount; (d) binding.

From these examples it is apparent that changing the name gave greater clarity to the identity of the find, since 'hinge' is more specific than 'fragment', and in the third example, find 4 from grave 97, this can be seen explicitly in the removal of the question mark in the card index text, which had denoted ambiguity.

5.5.2 Numbering of fragmentary and associated finds

As well as allocating a name to an archaeological find, the archaeologist allocated a number which, when combined with the grave number, became a unique identifier. Numbering the finds was not only important for the future identification of the items, but it also established significant relationships between items. The interpretive relationships between finds were represented in the way that they were numbered, either individually or as groups, and in the sequence in which they were numbered. Understanding the rationale behind different approaches to numbering and grouping was important to being able to identify patterns and thereby be sensitive to potential anomalies in the information.

As previously discussed, (Section 4.3.1 and Section 5.2), the archaeologist introduced the excavation numbering system that was used consistently in other records until the Curator introduced a new numbering system when compiling the catalogue. Two significant aspects of the archaeologist's numbering are considered first: the numbering of fragmentary finds, and the grouping of associated finds. This is followed by an account of our understanding of the Curator's approach, which involved changes to sequence, numbering and grouping.

Finds could be recognisable fragments of a previous whole. In some cases, a find was uncovered intact but disintegrated post-excavation, for example, the iron key in Figure 16.

In this example, there were multiple pieces that were associated from having been a single excavated find. The group were allocated the same number, and the finds card comment that the artefacts had disintegrated, suggesting that it may have been intact when it was numbered.

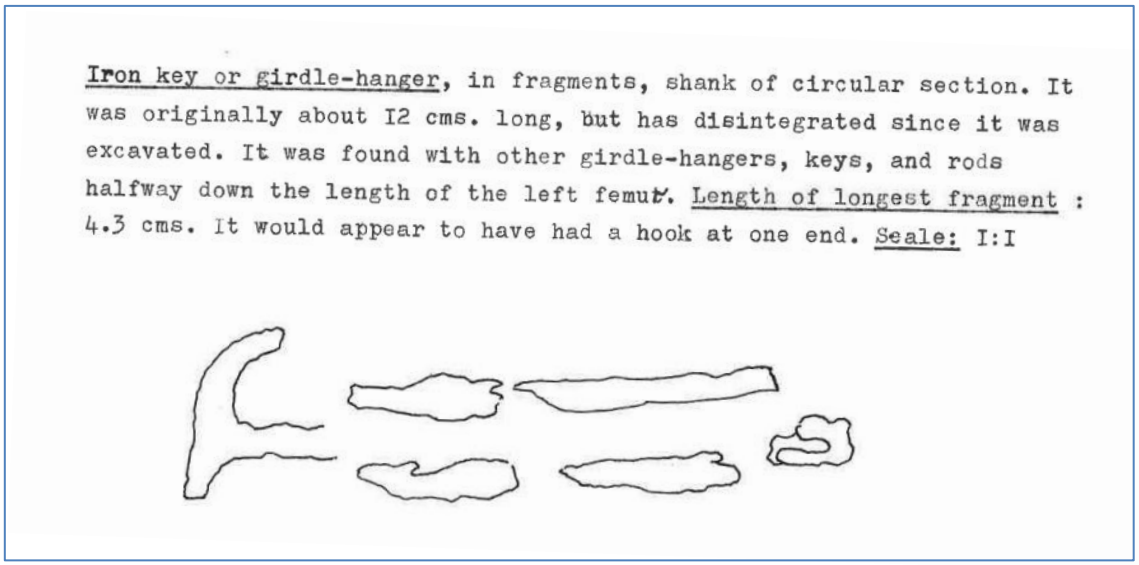

Iron key or girdle-hanger, in fragments, shank of circular section. It was originally about 12 cms. long, but has disintegrated since it was excavated. It was found with other girdle-hangers, keys, and rods halfway down the length of the left femur. Length of longest fragment : 4.3 cms. It would appear to have had a hook at one end. Scale: I:I

Figure 16: Finds card for find 28 from grave 161.

In other instances, the pieces were found in a fragmentary group and allocated the same number, even if they were excavated as separate pieces. For example, the shears in Figure 17.

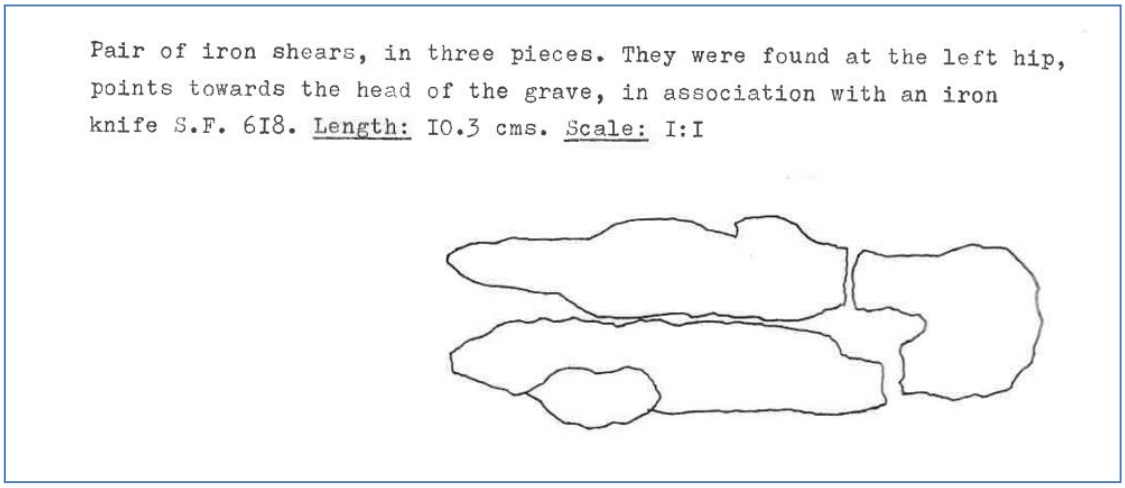

Pair of iron shears, in three pieces. They were found at the left hip, points towards the head of the grave, in association with an iron knife S.F. 618. Length: 10.3 cms. Scale: I:I

Figure 17: Finds card for find 7 from grave 134.

In extreme cases, a highly fragmentary find would be allocated a single number if the association was very strong due to pieces being of the same highly distinctive material and shape, for example, the fragmentary bone or ivory ring, thought to be from a purse shown in Figure 18. This find was fragmentary when it was uncovered and had disintegrated further post-excavation.



Figure 18: Photograph of find 31 from grave 161. Largest 8.6cm.

Some finds were excavated and numbered individually because they were considered to have previously been elements of a composite whole that has separated during burial. This often happened when the organic element (which may have bound the item together) decayed and disappeared. For example, if the cord of a necklace did not survive burial but the beads did, and these beads were found grouped at the neck of the human remains, then this group could be interpreted as having been originally part of a larger artefact. The location of the group of beads at the neck would suggest that they had functioned as jewellery (for example see Figure 6, Section 4.3.1). The association of these finds as having been elements of a necklace would be an interpretation of the type of item (that is, beads) and their arrangement in the grave. Finds could also be associated by physical similarities

in shape and material, and did not need to have been found in close physical proximity. For example, four large 'nails' from grave 135, all similar in size, shape and material, were found in four corners of the grave, interpreted as coffin nails, and grouped together.

On the St Thomas grave records, such associations were indicated by finds being bracketed together with the same name (for example, 'frags of iron mounts') or same find locations (for example, 'across foot of grave'), or occasionally an accompanying comment (for example, 'part of décor or contents of box'). However, the finds in such groupings were still numbered individually. On the card index, such comments were repeated in the text descriptions, and numbered individually as on the grave records. Additionally, finds were sometimes grouped together on the same card. This saved effort when information was duplicated (see Figure 19). However, the grouping of finds on the same card was discretionary, because up to 20 finds were found in the same area and interpreted as 'a box or pouch and its contents' and some were grouped together on a card while others were typed up individually. This grouping may therefore have simply been expedient rather than an indication of interpretation.

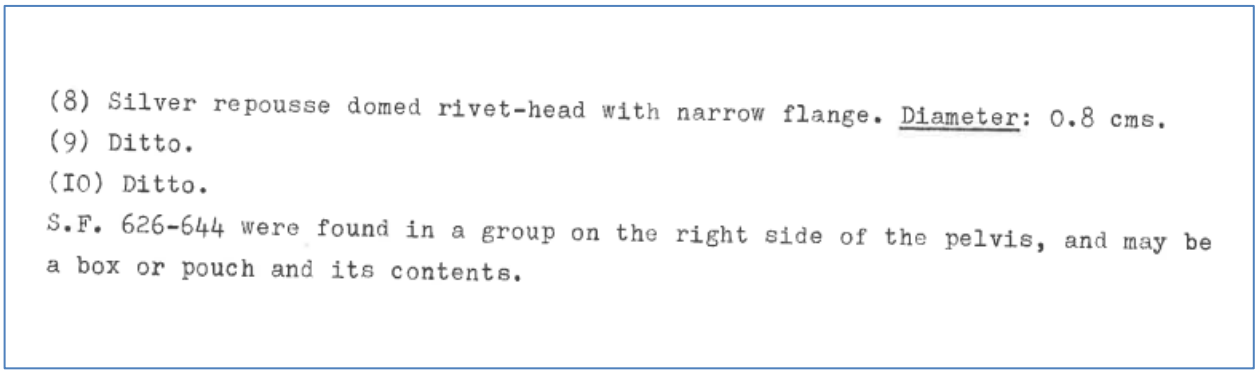

(8) Silver repousse domed rivet-head with narrow flange. Diameter: 0.8 cms.
(9) Ditto.
(IO) Ditto.
S.F. 626-644 were found in a group on the right side of the pelvis, and may be a box or pouch and its contents.

Figure 19: Finds 8, 9 and 10 from grave 135 listed on the same finds card.

5.5.3 Curatorial interpretation

The approach to grouping fragments under one excavation number and to number associated finds individually, was applied consistently in the grave record and then repeated in the card index. However, the Curator made substantial revisions when compiling the catalogue, including revising the numbering sequence and introducing a hierarchical numbering system. She used this new numbering system to indicate the associated groupings of finds. The hierarchical structure meant that a group of associated finds could be assigned a single number, and then within that, be individually identifiable by a letter. On occasion, she assigned a third level, using lower case Roman numerals. The Curator's rationale was not documented, but there were discernible patterns.

The sequence and grouping were revised to reflect the position in which finds were discovered, starting at the head of each grave, and progressing to the foot. Finds found at the arms would therefore come earlier in the sequence than those found at the legs. Within associated groups, finds were listed according to material, for example, copper alloy finds were listed before iron. Finds that were similar type or shape were grouped together. Table 11 shows finds 17 to 28 from Grave 161 as listed in the catalogue. The excavation numbers (the numbering sequence applied at the time of excavation) are listed on the table for comparison. The Curator re-numbered the whole group 161(3) and identified each find within the group by a lower-case letter. By comparing the excavation numbering with the Curator's catalogue numbering it is apparent that the sequence is significantly different. Finds of similar size and shape have been grouped together. The copper alloy finds are listed first, followed by the iron finds. The smallest and least distinctive finds are listed last. This approach to sequence, grouping and numbering was applied to other large groups of associate finds in the catalogue.

Catalogue number	Photo from time of accessioning	Excavation number
161(3a)		161(17) 161(18) 161(19)
161(3b)		161(23)
161(3c)		161(23)
161(3d)		161(24) 161(27)
161(3e)		161(20) 161(21) 161(28)
161(3f)		161(25)
161(3g)		n/n
161(3h)		161(26)
161(3i)		161(22)
161(3j)		161(22)
n/n		161(22)

Table 11: Finds 17-28 from grave 161 listed in catalogue sequence. Largest 12.8cm.

5.6 Limits of recontextualisation

Developing an understanding of how the records were created was key to understanding the differences between them so that we could complete the accessioning task. Our understanding of the context of creation was based on our developing familiarity with the records and the patterns of difference between them. However, this understanding was incomplete. We had limited scope to recontextualise the records, but we also encountered frequent instances where information content deviated from the patterns that we were familiar with.

Our recontextualisation was limited by our available resources, particularly time constraints. The DO did not have a specific deadline to complete the accessioning but felt under pressure to maintain a steady pace. We typically accessioned 30 finds a day, but then each find needed to be photographed and repacked, and the information entered onto the CMS, and the DO was fitting this work around other projects and the on-going responsibilities of her role. The DO was aware that some of the answers to gaps in our understanding may be found in the correspondence and associated documents at Museum A but had made the decision to limit herself to what was readily available so as not to be overwhelmed by material. She felt it may not be the best use of her time to consult vast quantities of documentation for potentially meagre gains that may not affect the accessioning outcomes. She welcomed my exploration of the archive, but I only had access on the fieldwork days when she was supervising me.

Similarly, there were pragmatic reasons for not consulting more widely, specifically obtaining access to records in the Conservation Department, or seeking records from external bodies such as DoE (later English Heritage, and now Historic England). We felt

that these avenues were not readily available to us, since the passage of time and lack of named contacts meant that gaining access and locating any relevant records may be a protracted process. We were therefore restricted to working with the records themselves, and what I had obtained from time spent with the other papers, mainly concerning the project chronology and the provenance of the records. Apart from the limits on what we could find out about the origin of the records, there were recurrent inconsistencies in the information content that remained unexplained. Just as the details of the routines that created the records remained unknown, the precise variations in performance of those routines could not be reconstructed, neither could we know the circumstances and interactions that led to specific performances.

Variations in the performance of routines stem from 'effortful accomplishment' (Becker, 2004, 648), but more specifically, choices made by participants (Feldman, 2000), who may select alternatives from an array of 'grammars of action' (Pentland and Rueter, 1994). This view suggests that unexplained variations in the records could have been part of wider patterns of action that fell outside the records that I analysed (so were outside our experience) or were shaped by specific circumstances that we had not discerned.

Some inconsistencies in the records point to discretionary performances by the creator. This is seen in decisions to attach a pencil sketch of finds to the grave record. Also, numerous variations in the card index suggested discretion, such as decisions to group multiple associated finds on one card even when they were numbered individually, decisions to include a line drawing or not, and the addition of interpretive comments, or comments on condition or associations. These occurrences were not numerous enough for

us to discern a pattern, but also when time was tight, we would prioritise explanations of discrepancies that had an impact on the accessioning task.

The most significant deficit in our understanding was circumstances around incomplete or missing information in the records. This had a significant impact on our ability to complete the accessioning task. Supposition about the rationale behind discretionary choices hinged on whether inconsistencies in the records were erroneous or resulted from adherence to a 'rule' or pattern. In other words, did the anomaly in the record stem from purposeful action (a discretionary choice), or was it an accident or mistake. For example, if a find was not numbered this could have been because a decision was made that the piece did not require or deserve a number; it could have become displaced from its label and grave group; it could have been a fragment of some other find that had broken off post-excavation.

Sometimes, associated finds were grouped under a single excavation number rather than numbered individually. In one instance this was due to two artefacts being fused together on excavation and subsequently separated during conservation treatment, but this also occurred where finds were related from being similar material (Figure 20) or being found in the same location, where there was no suggestion in the documentation record that they were previously joined. We also encountered instances where a find had an excavation number but not an SF number, or a find was depicted in an illustration but could not be located. Such occurrences were so rare that it was very difficult to ascertain a pattern that would indicate purposeful action. This suggested that the lack of information was erroneous in some way, but it remained unexplained.



Figure 20: Photograph of find 18 from grave 135. Largest 1.1cm.

The most challenging inconsistencies concerned labels which were misplaced or missing altogether, which we encountered frequently. An example of mis-labelled finds from grave 161 is shown in Figure 21. Our understanding of the creation of these labels was that each find was individually labelled, so we assumed that the arrangement of labels in Figure 21 was not deliberate, nor was it the original arrangement. We knew from our general experience of working with museum artefacts that handling and transporting items presented opportunities for labels to inadvertently move when they were not secured in some way. So, understanding details of the context of creation would not have explained the current arrangement that most likely resulted from subsequent events. Even knowing the circumstances under which labels migrated would not necessarily have helped us infer their original arrangement.



Figure 21: Inconsistent labelling of finds from grave 161.

5.7 Chapter summary

As well as understanding the provenance of the documentation records (where, when, by whom and why they were created), we developed an understanding of how they were created. There was such consistency in the records themselves that this suggested the use of a routine to create them, and we assumed that this routine was similar to the documentation routine that we were performing when accessioning the finds. While it was not possible to reconstruct the routine that was used decades ago, we drew inferences from the patterns we discerned in the information content of the records. These inferences were derived when seeking explanations for the discrepancies between the records, so the aspects of routine described in this chapter relate directly to our mode of use, and our need to understand why the records differed. The aspects of routine that we discerned are summarised in Table 12, listing the types of information affected, and what was revised in the card index and the catalogue.

Aspect of routine		Card index	Catalogue
Transfer		Excavation number	-
Packaging	Omissions	Grave details Skeleton details	Comments on condition and associations Visual representation (drawing)
	Additions	SF number Text description Dimensions Comments on condition and associations Visual representation (drawing)	-
	Syntax and wording	Position in grave Use of sentences Terminology	Position in grave Truncated phrasing Terminology
Updating		-	Measurements Text description, including results of analysis Terminology
Interpretation	Wording	Name	Name Text description
	Numbering	-	New numbering system Sequence Grouping

Table 12: Summary of aspects of routines in the creation of the card index and the catalogue.

These aspects of routine relate directly to provenance and the key contextual factors discussed in Chapter 4. When each documentation record was created, the information content was packaged in response to the purpose of the record and to meet the requirements of that purpose, that is, packaging related to the provenance of the record. With the creation of each documentation record, the information content was updated, in response to the requirement that the records should be up-to-date, and as a consequence of the contextual factors of decay, conservation and scholarship. Lastly, interpretation, which resulted in substantive differences between the records, involved the representation of scholarship. As well as developing an understanding of these aspects of the documentation routine, we became familiar with some of the patterns that indicated how these aspects were performed, for example, patterns in the Curator's use of terminology or the rationale behind her re-numbering.

There were limits to our understanding because there were discrepancies between the content in the records that remained unexplained. However, understanding these aspects of routine played a crucial role in helping us understand and explain the differences between records, which enabled us to complete our accessioning task. The next chapter sets out how our understanding of context played a role in our use of the documentation records.

6 Contextualising the records

In preceding chapters, our understanding of the context of creation of the documentation records was discussed in terms of chronology and provenance; three key contextual factors of decay, conservation and scholarship; and our understanding of aspects of the routine that shaped the information content of the documentation records. Taking these elements together, we built a picture of not only the origins of the records: where, when, why and by whom they were created, but also how the content was shaped. The more we used the records the more familiar we became with the information content, and it was through use that we developed and refined our understanding. It was also through use that we applied this understanding of context to help us interpret the information content in the records, that is, we were able to contextualise the records when we used them. This chapter sets out how we used different aspects of our understanding of the context of creation when interpreting the documentation records.

6.1 Conditions of use

This section looks more closely at the role of the sets of documentation records in the completion of the accessioning task. The ostensive and performative elements of our accessioning routine were described in Chapter 3 (Section 3.6.1), along with the difficulties we encountered. Table 2, in Chapter 3 (Section 3.7), sets out the four steps of the accessioning routine:

- Step 1) Identify the find
- Step 2) Verify the identification numbers
- Step 3) Assign a museum number
- Step 4) Revise accessioning spreadsheet

In Step 1, we looked first at the name and description on the catalogue and matched it to an actual artefact, and in Step 2 we referred to the artefact's label to verify the excavation number, and if possible, the SF number. It was during these two steps that we encountered most difficulties, the most common being difficulties in identifying the artefact if the catalogue entry was too generic or incomplete, and missing or misplaced labels.

Table 13 sets out an example of how we cross-referenced the different records to resolve difficulties in Step 1 and Step 2 of the accessioning routine. In this example, we were familiar with the Curator's use of abbreviations ('frag') and terminology, so we knew what type of artefact to look for. In Step 1, we identified an artefact that fitted the description well enough and was roughly the same size. The actual length was 40mm, but this was near enough because it was possible that find had changed subsequently, or that the Curator has measured using a different method to us. There was no label, but we expected to find an illustration that was an accurate representation of the artefact because we understood that illustrations were completed after conservation work.

In Step 2, we found an illustration that matched very well and was numbered as 97(20). We had no reason to believe this was incorrect because we considered the illustrations to be highly credible, so we located the finds card for 97(20) to check the information with the catalogue and the actual artefact. The wording on the finds card was a reasonable match for the catalogue because of the descriptive phrase 'flat section'. The change from 'piece of iron' on the card to 'strip' on the catalogue did not concern us because we understood that the Curator compiled the catalogue using her own wording to name and describe the finds. The dimension given on the finds card and the catalogue matched exactly, which was a strong indication that this was the find referred to in the catalogue.

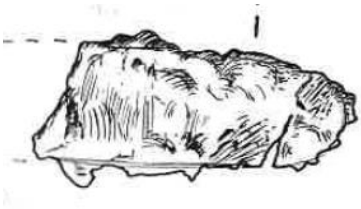
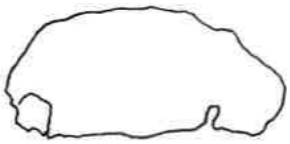
	Action	Find 20 from grave 97
Step 1) Identify the find	Check the catalogue for name, description and dimensions	Name: Strip Description: Strip frag, flat-section Length: 3.5cm
	Identify the find that matches	The name 'strip' was ambiguous but the description and length were a reasonable match for this find (photograph from time of accessioning). The length was 4.0cm, but could have changed due to conservation treatment or different method of measurement. 
Step 2) Verify the excavation number and SF number	Check the label for the excavation number; check the finds card for the SF number; enter onto the accessioning spreadsheet	The label was missing but we identified the corresponding illustration that was a good match for the find. The illustration was numbered 97(20). 
		We confirmed the excavation number by locating the finds card for 97(20) and checking the information: Tongue-shaped piece of iron, of flat section, with wood adhering to the underside. It was found with other fragments of wood and iron at the foot of the grave. Length: 3.5 cms. Max. width: I.6 cms.
		We obtained SF number 554 from the finds card. Comparing the description with the catalogue, the word 'strip' did not appear on the finds card, but the phrase 'flat section' did. The length was identical. This was therefore a convincing match.
		The drawing on the finds card was slightly different to the find, although the tiny notch on the side was a distinctive feature: 
		The find could have changed shape due to conservation treatment if fragments had been added, alternatively, the shape could have changed if it had disintegrated slightly. Since the length of the find was 40mm, the former explanation was more likely. Overall, this confirmed that the find and the excavation number were a good match for the find listed on the catalogue.

Table 13: Information from different records used to accession find 20 from grave 97.

Finally, the line drawing on the finds card had some similarities and some differences with the illustration and the actual artefact. We understood that the information on the card index

were observations taken directly from the finds themselves, furthermore, we viewed the card index as highly credible, so the discrepancy with the line drawing was potentially problematic. However, the most likely explanation for the difference was that the artefact had changed due to conservation treatment, for example, small fragments may have fitted the find and been glued to it, resulting in a change of shape. Locating the conservation records could have confirmed this, but we were satisfied with this explanation and proceeded with the rest of the accessioning task.

The documentation of this find would have taken about five minutes, including the time to take fresh observations of the find (dimensions and weight) and enter all information onto the accessioning spreadsheet. This example therefore shows how the performance of the task was tempered by pragmatic decisions. For example, we did not spend time trying to look for the missing label because with a quick glance we could see that labels for this grave group were typically misplaced. Working under time constraints, our aim was to identify the finds and excavation numbers with confidence, rather than explain 100% of discrepancies with certainty. We developed a tolerance for satisfactory or probable explanations, but also frequently assessed finds in groups, using a process of elimination to match them to the corresponding catalogue entries. Our experience of the accessioning task varied greatly from unproblematic to extremely challenging, with differing degrees of difficulty in-between.

The easiest finds to identify were the distinctive types of find, such as knives. This was because of their shape, size and material, but also because the name was typically consistent across all records (such as Figure 14, Section 5.5.1). Finds were also distinctive if they were an unusual material such as bone or ivory, wood or gemstones (such as the

purse in Figure 18, Section 5.5.2). When finds were distinctive, we were able to identify them with confidence and may not need to cross-reference other records. Finds were also relatively easy to identify when information matched up with only minor discrepancies, such as dimensions varying by 5mm or less (as was the case in Table 13), or names and descriptions containing similar or matching words.

Conversely, the most difficult cases concerned fragmentary finds with few distinctive features, or groups of finds that were similar in size, shape and material. Information was difficult to match up if it was incomplete or varied greatly, or where there were multiple discrepancies making it difficult to tell if information was referring to the same find. The vast majority of cases involved multiple discrepancies between records and required us to refer back and forth between records and finds until we were satisfied that information matched, or discrepancies could be explained. In such cases, we cycled through possible combinations, building a biography of the find and its documentation until we were satisfied. Our perception of the relative credibility of the records was a significant aspect in these cases because when faced with conflicting information we needed to consider the potential for errors, and records that we viewed as trustworthy were less likely, in our view, to have mistakes. Our understanding of context also contributed to our evaluation of credibility.

The rest of this chapter looks more closely at how our understanding of aspects of context affected our use of the records, influencing our interpretation of the information content and the credibility of the record as a whole. In practice, the aspects of context combined to form an overall picture of the history of the group of finds that facilitated the accessioning work. However, our understanding of particular aspects of context influenced the

accessioning task in specific ways. The influence of provenance, packaging, updating, and interpretation are considered separately. This is followed by consideration of instances where we were able to reconstruct an understanding of specific events. The chapter ends by looking at the limits of reconstruction.

6.2 Provenance: When, where and by whom

We did not have precise dates for the creation of the records, but our understanding of the phases of documentation was enough to help us understand the rough chronology. For example, the creator of the card index would have been able to refer to the grave records, and the Curator would have had access to the card index and the grave records when she compiled her catalogue. The timescales were significant when integrated with other time-sensitive aspects such as conservation and decay, or the development of knowledge, and when considering the effect of other activities such as the creation of the illustrations, and scientific analysis. When interpreting the information content in a record we needed to be able to situate the record in the overall chronology (described in Section 4.1) and relate this to the artefacts. This was an essential element in understanding how the records related to each other.

The location of creation was relevant because, as far as we knew, not all activities took place at Museum A. There were detailed records tracking the movement of finds that showed that finds were transported to and from the artists. The packing, transport and unpacking of finds were opportunities for finds to go missing or become disassociated from their labels. So being aware of this was another aspect of context that contributed to our understanding of the biography of the overall assemblage. More specifically, since the artists were working off-site, they may not have had access to any records other than the

labels or annotations on housing (such as boxes or bags) and so may have been entirely reliant on these when numbering their drawings. This would explain anomalies in the numbering of illustrations because if a drawing was not numbered this could have been because the label was missing when the find was received by the artist, rather than due to the artists forgetting to include the number or misplacing the label themselves.

Some of these expectations related to our perception of the competence and professionalism of the artists, so it was relevant for us to understand authorship. In terms of authorship more generally, being able to attribute the creation of records to named individuals was not as significant as understanding the roles and responsibilities of the individuals, and understanding whether there were multiple contributors. For example, knowing the names of the artists did not affect our use of the drawings, but knowing that more than one artist had produced drawings explained why some finds were illustrated more than once, although it was possible that one artist produced two different styles of drawing).

This was particularly significant when finds were very similar in appearance and illustrations sometimes lacked a number. We needed to be sure that similar illustrations depicted the same find rather than two different but very similar finds. For example, Figure 22 shows illustrations of find 5 from grave 134. This find consists of two similar items and both have been illustrated twice, in two different styles.

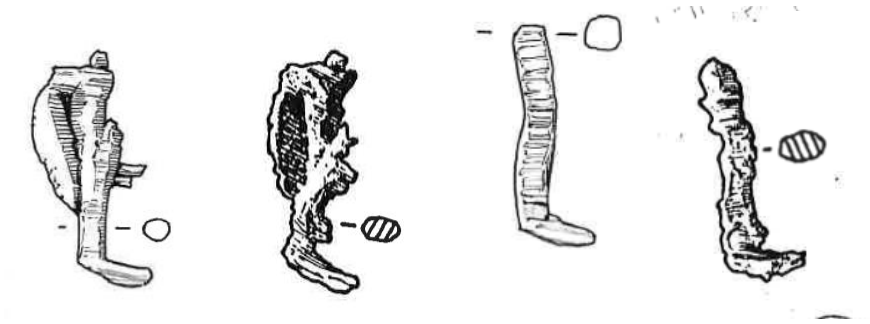


Figure 22: Illustrations of find 5 from grave 134 in different styles. Length 3.4cm.

Our understanding of the competence of individuals contributed to our perceptions of the credibility of the records. For example, we expected high standards of competence from the artists because one named individual was employed by the drawing department at DoE, while the other individual was a freelance artist. Both were therefore employed as artists to produce illustrations of a standard suitable for archaeological publication. The account from Dobie is explicit in her description of the strict working conditions in the DoE drawing team at that time (Dobie, 2003). So, we not only had confidence that the illustrations depicted the finds with great accuracy, but also that the numbering on the illustrations would be accurate. Another aspect of credibility stemming from competence was that we also considered it unlikely that the artists were responsible for missing finds or missing and misplaced labels. These perceptions of credibility were strengthened by our experience of using the illustrations which we found to be highly reliable.

We were able to associate the records with two other named individuals: the lead Archaeologist, and the Curator. However, this offered limited insight that facilitated the use of the records. These individuals were active many years ago, and we did not know them personally or by reputation. However, we had expectations about their expertise

given their respective roles and this contributed to our perception of the credibility of the grave records and the catalogue. In general, a broad understanding of how the records were created was more relevant than knowing the specific individuals who were involved in their creation. Similarly, an overview of provenance helped us to build an overall picture of the documentation and study of the St Thomas finds over the years, but the details of when and where the records were created did not directly affect our interpretation of them.

6.3 Packaging: Formatting to suit purpose

As discussed in the preceding chapter, packaging is related to the 'why' of provenance because it concerns the shaping of information content to meet the requirements of a particular purpose and particular group, or groups, of intended future users. In other words, packaging is concerned with ensuring the temporal mobility of the information resource (Markus, 2001). Packaging affected the addition and omission of types of information, as well as the way in which information was represented in syntax and wording (Section 5.3).

The way that records were formatted affected our use of them, not so much in the addition or omission of types of information, but rather in the differences in representation, that is, syntax and wording. This is because differences in representation meant that the information rarely matched. Table 7, Table 8, Table 9 and Table 10 in Chapter 5 give some examples (Section 5.3.2; Section 5.3.3; Section 5.4.1; Section 5.1.1). Despite the frequency and extent of these discrepancies, we were able to account for them with our understanding of packaging. None of the catalogue descriptions for the finds analysed in this study were a match for the descriptions on the corresponding finds cards. The Curator reworded the names and descriptions to meet the requirements for brevity in the archaeological report, and made use of technical terminology, or terms carefully chosen for their specificity

(Table 7, Section 5.3.2). However, when comparing the two we learned that there were usually one or two key words that appeared in both records (for example, 'flat section' in Table 13, Section 6.1) and that the resulting descriptions were sufficiently similar to be interpreted as describing the same artefact.

Comparisons of differing text descriptions were aided by cross referencing with the drawings, dimensions and the finds themselves, so we rarely relied solely on the wording to verify the identity and numbering of a find. Furthermore, as the accessioning progressed, we became familiar with the Curator's lexicon and phraseology so were able to decide quickly whether the records were describing the same find. Understanding that the catalogue was compiled for a slightly different purpose than the card index allowed us to broadly account for the extent of the differences and therefore be sensitive to the similarities.

6.4 Updating: Chronology of conservation and decay

Our understanding of how the finds changed over time was highly significant in accounting for differences in the records. Conservation and decay could potentially have a dramatic impact on the shape and size of a find and could affect multiple finds if two individually numbered fragments were joined together, or a single numbered find was separated into two or more pieces. These aspects of underlying context could therefore affect the dimensions, visual appearance and description in the records, including the number of pieces being recorded and thereby the numbering (for example, Figure 13 and Table 9, Section 5.4.1). Furthermore, a fragmentary artefact could be pieced together during conservation treatment but then disintegrate again afterwards.

Our understanding of conservation and decay integrated with our understanding of the chronology and provenance of the records, and how the records were created, because it was significant that we understood roughly when records were created, particularly in relation to conservation treatment, and also that the information was obtained from direct observation of the finds, rather than adapted from another source. This latter point greatly influenced our perception of the records as accurate documentation of the finds at a particular time, and thereby greatly increased our perception of the records' credibility.

Since the records were created at different times over the past forty years they could be seen as representations of the changing physical nature of some of the finds. The long length of this time span was significant for understanding the changes that the finds underwent because archaeological material could decay over that time and conservation treatment could fail, not due to the competence of the conservator but due to the natural deterioration of materials used in conservation treatment such as adhesives (Cronyn, 1990; Pye, 2001).

In some cases, we were able to reconstruct an approximate biography by cross-referencing the information and applying our understanding of chronology and material change over time. For example, Figure 23, Figure 24, Figure 25, Figure 26 and Table 14 depict the varying appearance of find 4 from grave 135 as documented in the different records. Based on these documentation records, the chronology can be understood as:

1. Artefact excavated, fragmented in two pieces (finds card, Figure 23)
2. Fragments joined during conservation treatment (illustration, Figure 24; catalogue entry Table 14)

3. Tip broken off (illustration, Figure 25)
4. Disintegration into two pieces (photograph at time of accessioning, Figure 26)

As a result of these physical changes over time, at the time of accessioning none of the records accurately described the current condition of the artefact. Nevertheless, this rough chronology accounted for the multiple discrepancies and enabled us to identify the artefact with confidence.

The significance of being able to reconstruct the biography of a find that had undergone so many changes over the decades was that we needed to be able to recognise when records referred to the same find, even when the information differed. This meant that we could then be confident about the identity and numbering of the find.

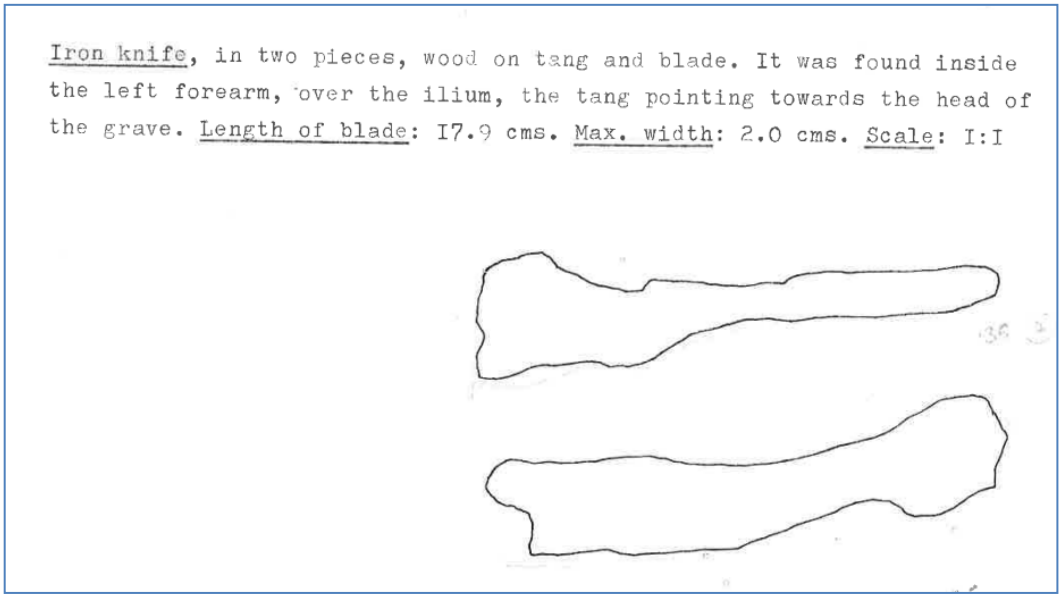

Iron knife, in two pieces, wood on tang and blade. It was found inside the left forearm, over the ilium, the tang pointing towards the head of the grave. Length of blade: 17.9 cms. Max. width: 2.0 cms. Scale: I:I

Figure 23: Finds card for find 4 from grave 135.

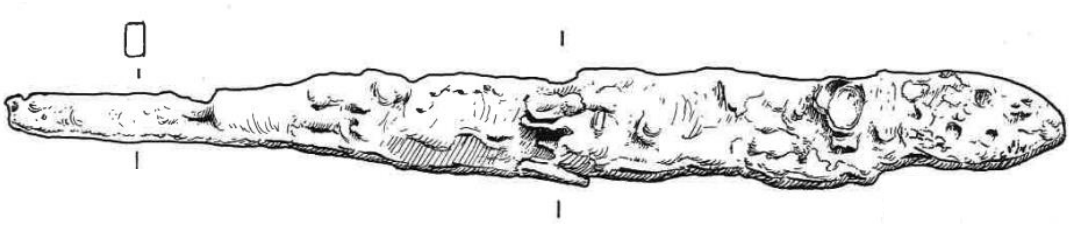


Figure 24: Illustration of find 4 from grave 135.

Name	Knife
Quantity of pieces	1
Material	Iron
Length	17cm
Description	curved back, straight cutting edge. Traces of leather sheath, covered in pupae cases, but no identifiable organic material on tang.

Table 14: Extract from catalogue entry for find 4 from grave 135.



Figure 25: Amended illustration of find 4 from grave 135.

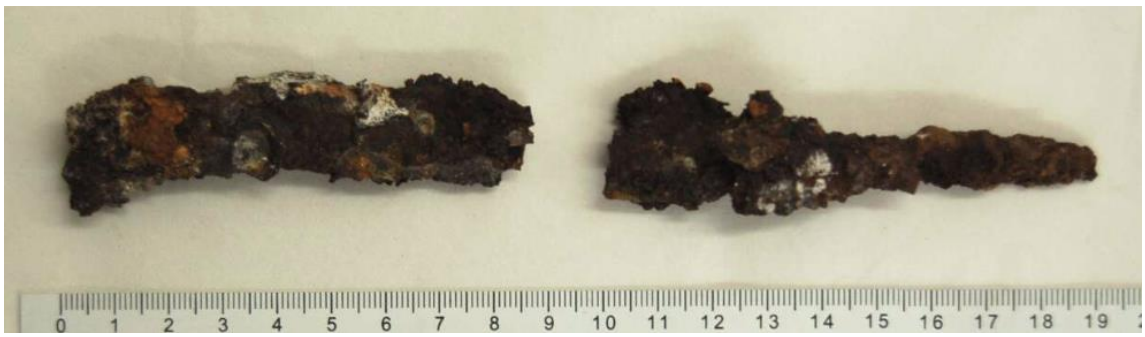


Figure 26: Find 4 from grave 135, photograph from time of accessioning.

6.5 Curatorial interpretation

The different documentation records represented different interpretations of what the finds were, as well as differing styles of wording for describing the finds and differing styles of visual representation. As previously mentioned, being able to recognise the style of drawing meant that we were able to reconcile illustrations and finds, taking account of the possibility that finds may be drawn more than once (Figure 22, Section 6.2). Similarly, we learned to recognise the terminology and phrases used by the Curator to name and describe the finds. This made it easier to match catalogue entries with finds cards even when only one or two words were the same.

Apart from changes to wording, the Curator made changes to the numbering, sequence and grouping of the finds. Changes in sequence were significant because this meant that we could not accession the finds according to the excavation number on the labels. Instead, we followed the catalogue sequence and needed to identify each find listed according to the information in the catalogue entry. We quickly realised that changes to the sequence occurred frequently in the catalogue, but we were able to interpret this as part of the Curator's approach to cataloguing and it did not disrupt the accessioning task. Instead, as we became more familiar with the catalogue, we started to see patterns in the Curator's numbering and understood more of their rationale (Section 5.5.3).

While the difference in sequence between the excavation numbering and the Curator's numbering resulted in significant discrepancies these did not cause difficulties for us. Furthermore, having an understanding of the rationale behind the Curator's interpretation was an additional means for identifying the finds when dealing with groups of similar associated artefacts. For example, Table 15 lists a large associated group of finds from

grave 135, also shown in Figure 27. This group consisted of metal rivets and mounts made of silver or bronze, some of which were intricately worked, and some that were embedded in scraps of leather. These finds were very small, the largest measuring 2.5cm. They were found together in a cluster, were thought to be fittings from a leather pouch, and were numbered individually. Other small finds, including a pair of bronze tweezers (Figure 14, Section 5.5.1), an amber bead, and fragments of glass (Figure 20, Section 5.6), were found in the same group and could have been part of the contents of the pouch.

The Curator listed the pouch fittings in a group numbered 5(a) to 5(i), and listed the other small finds immediately afterwards. While these finds were very distinctive, the pouch fittings were not. However, we were able to identify them by using the catalogue descriptions, which were detailed, and by following what we could discern of the Curator's sequence. Table 15 shows the sequence in which the finds were numbered in the catalogue. We ascertained that silver finds were listed before the bronze finds. Also, the sequence placed similar shaped finds together, while adhering to the excavation numbering sequence for the most part. The rationale for the Curator's sequence and grouping was particularly useful for identifying these finds because, on this occasion, the descriptions of the finds cards were significantly different from the catalogue. This, coupled with the quantity of very similar finds, resulted in a confusing picture. Furthermore, the material was sometimes identified erroneously on the finds cards, with bronze sometimes identified as silver, and vice versa. This added to the confusion, so we chose to focus on the descriptions on the catalogue and use those to identify the finds. This, coupled with our understanding of the curatorial sequence, facilitated identification and completion of the accessioning task.

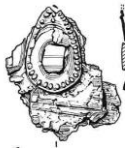
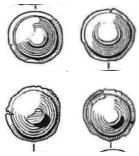
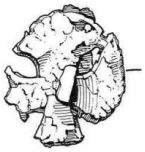
Catalogue number	Illustration	Catalogue material	Catalogue description	Excavation number
5a		Silver	Leather pouch remains. Silver pear-shaped mount with central repoussé boss, narrow flange, milled border.	135(6)
5b		Leather; Silver; Copper alloy	leather frag with part of similar mount attached by square-headed copper alloy rivet with bifurcated shank	135(7)
5c		Silver	domed heads from small rivets, narrow flanged borders, 1x flat-section shank remains	135(8) 135(9) 135(10) 135(16)
5d		Silver	pear-shaped mount, similar to 135.5a, 135.5b	135(14) 135(15)
5e		Leather; copper alloy	leather frag with remains of copper alloy rivet	135(11)
5f		Leather; copper alloy	leather frag with remains of square-headed copper alloy rivet	135(12)
5g		Leather; copper alloy	leather frag centrally pierced by dome-headed, copper alloy rivet, with impression of a pear-shaped mount preserved in the leather	135(20)
5h		Leather; copper alloy; organic	leather frag centrally pierced by square-headed, copper alloy rivet with bifurcated shank. Impression of a pear-shaped mount preserved in the leather, organic remains on back	135(21)
5i		Leather; copper alloy	leather frag, in the form of equal-armed cross with expanded terminals, centrally pierced by square-headed, copper alloy rivet with bifurcated shank	135(22)

Table 15: Catalogue entries and illustrations for associated finds from grave 135.

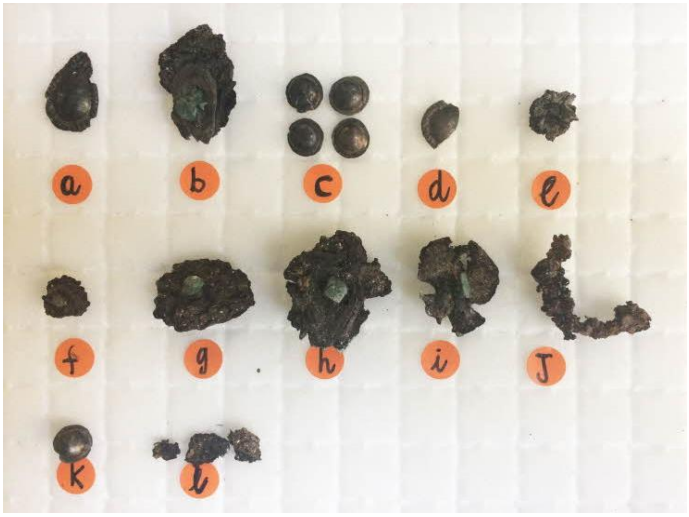


Figure 27: Photograph of associated finds from grave 135. Largest 2.5cm.

6.6 Reconstructing isolated events, interactions and limits

While particular aspects of our understanding of context aided interpretation in specific ways, in practice, we typically encountered multiple discrepancies, and when seeking explanations in such cases the aspects of context interacted. In the most complex cases of multiple discrepancies there were multiple explanations, and we needed to untangle these interactions to develop a plausible explanation. In some cases, this resulted in the identification of an isolated event, in others we reconstructed multiple events, and in the most challenging cases, we reached the limit of our understanding and retained a high degree of uncertainty about the identification of finds, and our explanations. The last few examples illustrate these three scenarios: an isolated event; the reconstruction of interactions; and a case with high uncertainty.

6.6.1 The isolated event

There was no difficulty in identifying find 19 from grave 161 because it was highly distinctive in size and shape, and it was in remarkably good condition (Figure 28). It was described as a bronze slip-knot ring, or armlet, and was unusually large, with a diameter

of 8.5cm. We therefore did not need to cross-reference with other records to identify it. However, the label for the find had anomalous numbering: GR 161 29/135 (Figure 29). This anomaly was cause for concern and so we sought an explanation for it.



Figure 28: Find 29 from grave 161. Diameter 8.5cm.

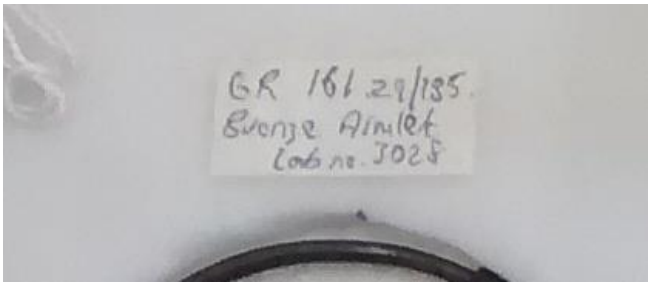


Figure 29: Label for find 29 from grave 161.

The artefact was so distinctive that it was easy to locate the correct finds card, which had a text description that was a good match for the find. This finds card provided the excavation number 161(29) and SF number 735. At this point we were able to confidently explain the discrepancy with the label. The label had been written with '/1' instead of numeral '7'. We therefore concluded with certainty that the label was incorrect and so we could disregard it.

We were already familiar with the typical paper labels (Section 4.3.2) and this particular label, stuck on to the foam housing, was highly unusual. The format of the label, handwriting, and presence of 'Lab no.3028' all indicated that this label was a later addition. We recognised the lab number as a reference to records in the Conservation Department, so inferred that the label was most likely added after the find had received conservation treatment. This suggested the possibility that it was written by someone unfamiliar with the St Thomas numbering systems, which helped to explain the error in notation. In addition to our reconstruction of the creation of the label, the illustration of the find was numbered in exactly the same way, accurately repeating the same error (Figure 30).

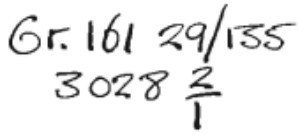


Figure 30: The numbering for illustration of find 29 from grave 161.

This was of interest because it indicated that the drawing was carried out after the error with the label occurred, which concurred with our rough chronology of illustrations being created after conservation treatment. When chronology was taken into account, and given the highly specific error in the numbering, this was the most likely explanation for the erroneous numbering of the illustration. In this instance, the anomalous notation on the label stood out from an array of discrepancies that we had already disregarded.

By this stage in the accessioning task, our understanding of the context in which these records were created was integrated in our mode of use to the extent that many differences were accepted as part of the regular patterns we encountered in the information content,

and therefore barely noticeable to us. For example, the catalogue numbering and sequence deviated from the excavation numbering, and the wording on the catalogue differed from the finds card. The label was an exception that disrupted these patterns and triggered further investigation, even though the identity of the find was not in question.

6.6.2 The reconstruction of interactions

The accessioning of find 8 from grave 134 was unusual because this group consisted of several relatively large items that had been assigned the same number at the point of excavation, despite apparently not being joined when they were uncovered. When groups of associated finds were excavated the pieces were typically numbered individually unless it was clear that they were fragments of a previously intact whole object. This particular group posed several problems because the items were very similar in size and shape, had received conservation treatment but subsequently disintegrated, and the numbering on the labels and the illustrations were inconsistent. Reconciling the records and the finds therefore required us to understand the interactions of multiple factors.

The first challenge was to identify the fragments. This was the last group of artefacts to be accessioned from grave 134, so we had no doubt about which finds to consider, but there were significant differences in the descriptions on the finds card and the catalogue, and these differed again from the illustrations, and from the artefacts themselves. We quickly realised that the finds had been conserved at some point, so needed to reconstruct an approximate chronology to be satisfied that the finds in front of us corresponded to those in the records. An extract from the catalogue entry is shown in Table 16. The description refers to three rods. However, Figure 31 shows the finds card for find 8 from grave 134, which refers to eleven fragments, and 'three pairs of two rods'. We had no doubt that this

was the corresponding finds card because we had already accessioned all other finds from this grave. However, the description on the card is contradictory since it does not indicate which pieces were originally joined together, and there is no explanation of how six rods became eleven pieces.

Name	Rod
Quantity of pieces	3
Material	Iron
Length	14.3cm
Description	looped rods x3, from chatelaine, shanks oval section, mineral-replaced textile on surface

Table 16: Extract from catalogue entry for find 8 from grave 134.

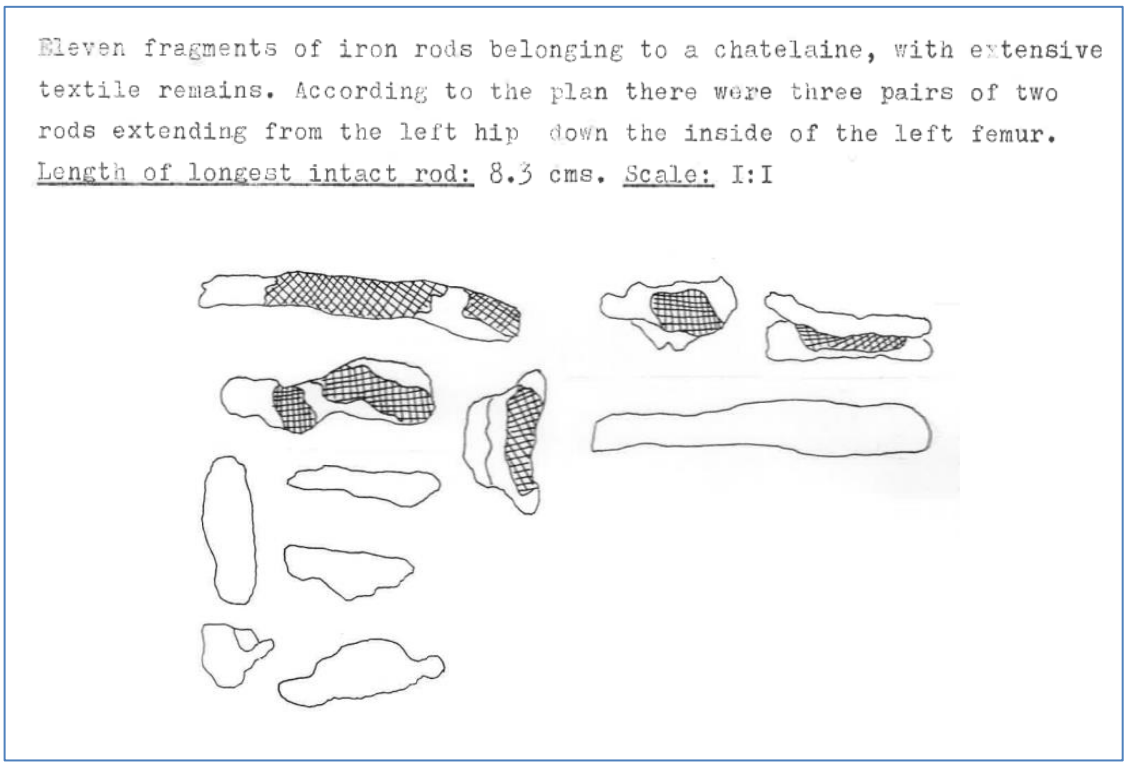

Eleven fragments of iron rods belonging to a chatelaine, with extensive textile remains. According to the plan there were three pairs of two rods extending from the left hip down the inside of the left femur.
Length of longest intact rod: 8.3 cms. Scale: I:I

Figure 31: Finds card for find 8 from grave 134.

The dimensions on the finds card and the catalogue do not match up either, but this strongly suggested that the fragments described on the finds card had been reconstructed during conservation treatment so that at the time of cataloguing there were three rods instead of eleven fragments. However, at the time of accessioning, there were seven pieces: five rods

and two smaller lumps (Figure 32). Furthermore, the illustrations (two sets of drawings) depicted four rods (Figure 33).



Figure 32: Photographs of find 8 from grave 134. Largest 9.0cm.

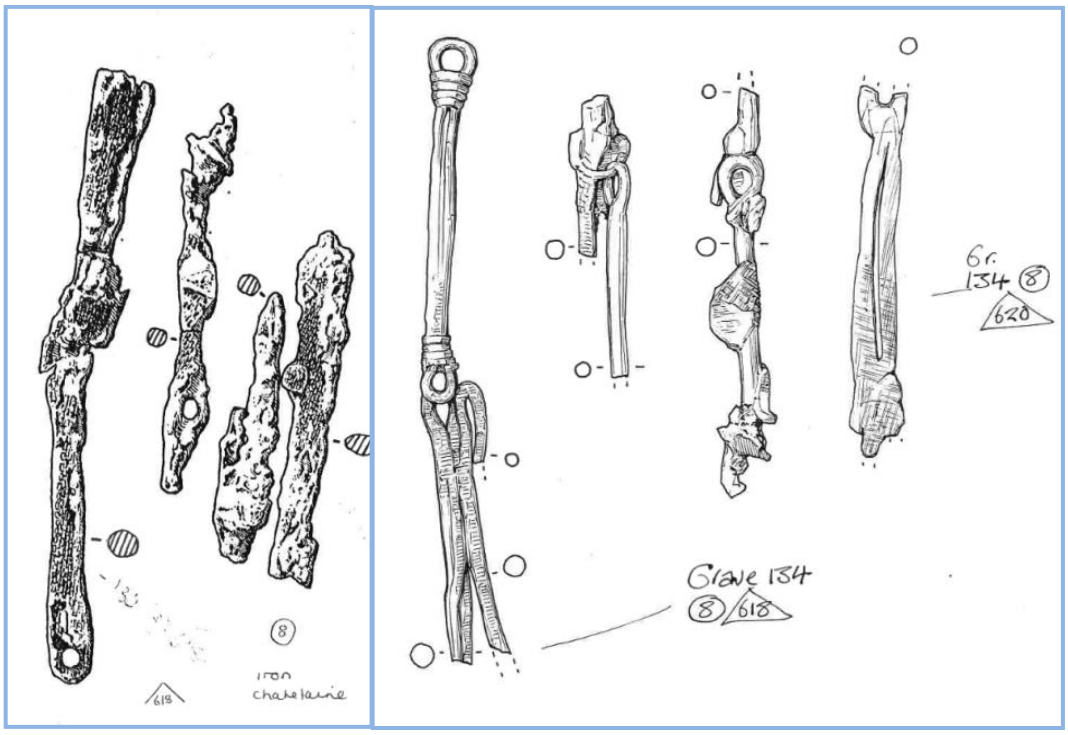


Figure 33: Two sets of illustrations for find 8 from grave 134.

Since the fragments were so similar in size, shape and material, we took time to match them with the illustrations, although the two smaller lumps (Figure 32) did not appear in any illustrations (we had no explanation for this). We concluded that two of the five surviving fragments had previously been joined into one rod, as shown in the illustrations, but had subsequently separated. It was possible that the two smaller lumps were depicted in the line drawings on the finds card. We could not identify the three rods described in the catalogue, but the most likely explanation was that another pair of fragments had previously been joined in conservation treatment, were catalogued as one of three rods, but had separated by the time the illustrations were created. Our reconstruction of the chronology can be summarised:

1. Fragments excavated, described as three pairs of rods (grave record)
2. Disintegrated into eleven fragments, recorded on finds card (Figure 31)
3. Conserved and reconstructed into three fragments
4. Catalogued as three rods (Table 16)
5. Disintegrated into four fragments
6. Two sets of illustrations created, depicting four fragments (Figure 33)
7. Disintegrated into five fragments
8. Accessioned as seven pieces plus a small bag of tiny shards (Figure 32)

In developing this chronology, we applied our understanding of the ways in which archaeological iron decays and is conserved, the likely timescale (since the grave record was dated 1969), and how these factors intersected with our understanding of the chronology of the records. This enabled us to confidently identify the finds, even though they had disintegrated since being catalogued.

Having identified the finds, we needed to confirm the excavation number and SF number, and in a further complication, we found two labels associated with the group each numbered differently (Figure 34). The finds card recorded the group as find 8 from grave 134, and both labels were numbered in this way (with 8 written in a circle, and grave 134 shortened to GR 134). This numbering also appeared on the illustrations. We were confident that the excavation number was 134(8), but the appearance of two different SF numbers needed to be resolved.



Figure 34: Two labels associated with find 8 from grave 134.

We were confident that the SF number was 620, as recorded on the finds card. However, one label was numbered with SF 618 (Figure 34, where the SF numbers were written under angled lines). The contradictory numbering also appeared in the numbering of the illustrations, one of which was numbered with both SF 618 and SF 620 (this time written inside a triangle). We knew that a find should only have one SF number and our eventual explanation for the contradictory labels was that the artefact with SF 618 (a knife) was find 6 from grave 134. We had had no difficulty identifying this find, since it was very distinctive, but its label was missing. Since the knife was stored in the same drawer as the rod fragments, it was possible that the label had become displaced and then at some point the number '6' was changed to '8'. We decided that this was the most satisfactory explanation, and it was supported by the appearance of the number 8 on the label that

appeared to have been overwritten. Having the erroneous numbering repeated on the illustrations was confusing and suggested that the labels became mixed up after cataloguing but before the illustrations were completed. This could be explained by the artist copying the labels that arrived with the finds and having no means for checking the numbering, such as access to alternative records.

When interpreting this case, aspects of context integrated to form an overall biography of these finds and their documentation. The absolute provenance of the records (who, when, where) was not as significant as the circumstances of their creation in relation to other events. In contrast, the likely misplacement of the label and subsequent mislabelling of the illustration are isolated events rather than part of a wider identifiable pattern.

6.6.3 The limits of reconstruction

The previous two examples highlighted difficulties caused by erroneous notation on labels: firstly, a highly distinctive armlet with a mis-numbered label; secondly, finds that had undergone multiple changes over time and had acquired a mis-placed and mis-numbered label. In both cases we reached a plausible explanation by reconstructing a likely biography of events. This final example concerned a much larger group of twelve finds where labels had been mis-placed and there were additional complications with the illustrations. As with the previous examples, some of the finds in this final case had been illustrated twice, but the finds were so similar that it was difficult to distinguish between some of them or discern a particular pattern in the Curator's cataloguing sequence.

There were many possible ways to match up the finds to the catalogue entries. In addition, some finds appeared to have undergone conservation treatment, and there were many

discrepancies with finds that were recorded on finds cards or were illustrated but that we could not locate. The possibility remained that labels had been misplaced, although in some cases the labels were securely attached to the foam housing, so this seemed unlikely. However, there were clear discrepancies between illustrations that appeared to depict the same find but were numbered differently, or labelled items that were clearly not the find described on the relevant finds card. In conclusion, we confidently identified five finds from the group but were less confident about the other seven. Some of the finds from this group are discussed here as examples of discrepancies that were exceptional and beyond the limits of what we could explain with our understanding of context.

As was the case with other challenging groups, the finds themselves were relatively small (less than 5cm in length). Many lacked identifying features and they were all similar in appearance. Photographs of the finds are shown Figure 35, along with the length and the numbering on the associated label, although several labels were missing. Table 17 shows the catalogue names, lengths and descriptions for the seven finds of uncertain identity. The challenge was to match the finds with the catalogue entries and then ascertain the excavation numbers. This could not be achieved by using the names and descriptions on the catalogue because of the similarities between the artefacts. We understood that the catalogue information had been packaged for publication, but this did not facilitate the identification of finds. The terse style of the catalogue entries was a hindrance when the finds were all of similar size and relatively featureless. While some of the dimensions in the catalogue records matched up with some finds, this was insufficient to provide a convincing match because of the scope for alternative matches.

Catalogue number	Name	Length	Description
4b	Mount frag	3.3cm	tongue-shaped frag, terminal pierced by rivet. mineralised beech (Fagus sp) on surface
4c	Staple frag	3.1cm	mineralised beech (Fagus sp) on surface
4d	Staple	4.9cm	mineralised beech (Fagus sp) on surface
4e	Staple frag	3.3cm	mineralised beech (Fagus sp) on surface
4f	Frag	1.8cm	curved section, mineralised beech (Fagus sp) on surface
4i	Staple frag	4.6cm	Staple frag
4k	Staple	3.1cm	Staple and frags

Table 17: Catalogue entries for seven finds from grave 97.



No label
Length: 3.3cm

Label: 97(10)
Length: 3.13cm

Label: 97(14)
Length: 5.22cm

No label
Length: 3.1cm

No label
Length: 1.8cm

Label: 97(19)
Length: 3.45cm

Label: 97(15)
Length: 3.3cm

Figure 35: Photographs of seven unidentified finds from grave 97.

We would normally expect to cross-reference with the card index and the illustrations to identify the finds and obtain the excavation numbers. However, these also did not match well, and the extent of the discrepancies exceeded what we could satisfactorily explain. Addressing the identification of the finds as a group was very demanding. A few of the artefacts are given as examples.

Table 18 shows the dimensions and drawings for the artefact labelled as find 10. The drawing on the finds card was a good match, as was the dimension on the finds card. Based on this dimension we matched the artefact with find 4c on the catalogue. There was also an illustration which was also a good match. However, a second illustration appeared to depict the same find but was numbered as find 21. We concluded that the numbering on this illustration was unlikely to be correct because the finds card for find 21 described it as 'four fragments of iron and wood' and the drawing on the finds card was significantly different from the illustration for find 21 (Figure 36). We had no explanation for the misnumbering of the illustration.

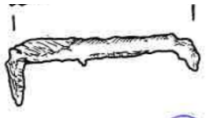
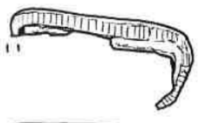
Possible catalogue no.	Find	Finds card	Illustration	Illustration
4c?	 Label: 97(10) 3.13cm	 97(10) 3.15cm	 97(10)	 97(21)

Table 18: Drawings and dimensions for find 10 from grave 97 (uncertain identification).

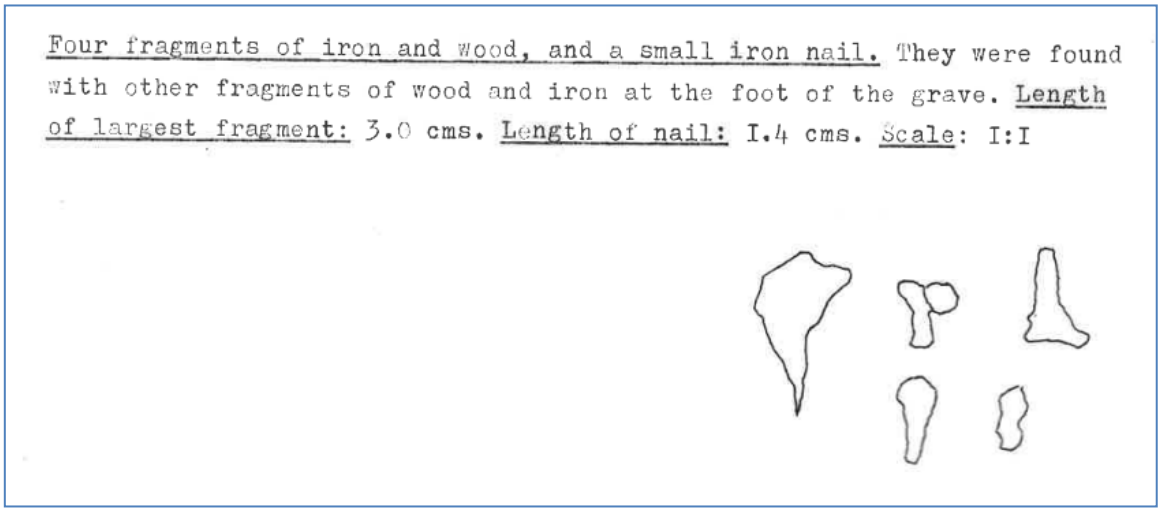

Four fragments of iron and wood, and a small iron nail. They were found with other fragments of wood and iron at the foot of the grave. Length of largest fragment: 3.0 cms. Length of nail: I.4 cms. Scale: I:I

Figure 36: Finds card for find 21 from grave 97.

Table 19 shows the dimensions and drawings for the artefact labelled as find 14. In this example there were two illustrations also numbered as find 14 that both matched the find. However, the finds card for find 14 described it as 'iron nail, small curved piece of iron, and four wooden fragments' (Figure 37). The line drawing from the finds card is shown in Table 19 and, as with the previous example, it is significantly different from the find and the illustrations. Since we considered the card index to be highly credible, we concluded that the artefact was unlikely to be find 14, however we struggled to identify it because none of the finds cards were a good match for it. In conclusion, when we accessioned the artefact, we associated it with excavation number 14 because we had no satisfactory alternative.

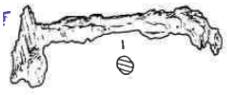
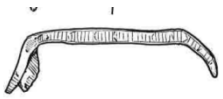
Possible catalogue no.	Find	Finds card	Illustration	Illustration
4d?	 Label: 97(14) 5.22cm	 97(14) 3.3cm	 97(14)	 97(14)

Table 19: Drawings and dimensions for find 14 from grave 97 (uncertain identification).

Iron nail, small curved piece of iron, and four wood fragments. They were found with other wood and iron fragments including several angle-irons, at the foot of the grave. Length of nail: 3.3 cms. Width of curved piece of iron: I.65 cms. Length of largest wood fragment: I. 3 cms. Scale: I:I

Figure 37: Description from finds card for find 14 from grave 97.

Table 20 shows the dimensions and drawings for the artefact labelled as find 15. In common with previous examples, there was an illustration that matched this find and was also numbered as find 15, but the dimensions and line drawing on the finds card were not a good match (Figure 38). However, we needed to consider if the finds card was referring to this artefact because the name, 'L-shaped angle-iron', was a plausible name for the find. We knew that archaeological materials could change in appearance over time but the discrepancy in this case exceeded what we could explain as resulting from decay or conservation treatment. In conclusion, when we accessioned the artefact, we associated it with excavation number 15. This was unsatisfactory but no other finds cards offered a better match.

Possible catalogue no.	Find	Finds card	Illustration
4k?	 Label: 97(15) Length: 3.3cm	 97(15) Length: 4.6cm	 97(15)

Table 20: Drawings and dimensions for find 15 from grave 97 (uncertain identification).

L-shaped angle-iron with substantial traces of wood adhering to it. It was found with other wood and iron fragments at the foot of the grave. Length: 4.6 cms. Scale: I:I

Figure 38: Description from finds card for find 15 from grave 97.

Despite our ability to contextualise the documentation records, we were unable to satisfactorily account for the discrepancies in these last few examples. It is possible that the multitude of difficulties in this particular group was caused by multiple errors or accidents such as mixed-up labels that then resulted in illustrations being mis-numbered.

However, this does not account for our difficulty in matching the finds with the information in the finds cards. There may therefore have been several other factors, such as conservation treatment and decay of the material, which contributed to an overall picture that was so complex that we were unable to reconstruct an explanatory biography.

6.7 Chapter summary

In total, 95 performances of the accessioning routine were analysed for this study and in each case the records differed in some way. Since the completion of accessioning typically required cross-referencing the records, we needed to be able to satisfactorily explain why the information content did not match up. Understanding the circumstances that shaped the creation of the documentation records enabled us to explain the differences between them, and our understanding of context was developed for that specific purpose and context of use.

However, we did not aim to explain all of the discrepancies all of the time, but instead sought satisfactory explanations that we felt confident in. In practice, aspects of our understanding of the context of creation integrated into an overall picture of the documentation of the finds over time, encompassing when, where, why, by whom, and how the records were created. Specific aspects of context: our understanding of provenance, contextual factors of decay, conservation and scholarship, and aspects of routine, influenced our explanations for specific types of discrepancy. Furthermore, some contextual elements accounted for patterns in the discrepancies to the extent that once we were satisfied that we had accounted for these patterns they no longer drew our attention. For example, we became familiar with curatorial interpretations as represented in re-numbering and changes to sequence, and use of particular terminology. We were able to

disregard such patterns when we felt we could explain them, and these explanations drew on our understanding of the circumstances in which the records were created. At the other extreme, there were times when we were able to reconstruct specific events that explained anomalies that we encountered in the records; again, this was by contextualising the records by drawing on our understanding of their context of creation.

Our understanding of context ranged from broad contextual factors regarding the museum setting and the nature of archaeological material, to specific details such as the use of multiple artists to create the illustrations. The explanatory power of this understanding lay in our ability to appreciate how these aspects combined and interacted. However, there were instances where combined factors, most likely compounded by accidents or errors, resulted in a complex array of discrepancies, or discrepancies of such extent that they exceeded our understanding.

7 Discussion and implications

This study began with a practical problem concerning the management of information in a museum where large quantities of archaeological finds needed to be documented, a task known as accessioning. During nearly a year of participatory fieldwork, I contributed to the accessioning of a group of archaeological finds, after which I analysed 95 performances of the task. Using routines as an analytical perspective, I investigated the accessioning routine with the aim to understand its difficulties (Section 3.6; Section 3.7). Accessioning involved collating information by cross-referencing multiple documentation records. These documentation records had been created at different times over the past 45 years, and very little of the information content matched up. The temporal mobility of these records, their ability to span the temporal boundary and be reused after the passage of time, hinged on our understanding of the circumstances in which they were created.

Routines can be characterised as well-defined, predictable and therefore highly stable processes (Pentland and Feldman, 2005), but they can also be seen as highly variable: an effortful accomplishment with each performance offering a range of actions, a grammar from which participants choose, under the influence of particular set of circumstances (Pentland and Reuter, 1994). Accessioning was a routine task in that it involved a recurrent pattern of action. It also had a prescribed outcome – the creation of an entry on the Museum's CMS (collection management system), the information system used for the management of the entire museum collection. And while the outcome was consistent, our efforts to achieve this outcome were not.

Dealing with multiple discrepancies in the records made our performance of the accessioning routine effortful, and our challenge was to understand why the documentation

records differed. Once we had accounted for the differences, we could match up the information content with the relevant artefact and complete the accession record. As our accessioning work progressed and we become familiar with the records, we developed an understanding of the context in which they were created. This understanding enabled us to explain the differences in the majority of cases, and thus complete the accessioning task.

In this study, I adopted an autoethnographic approach, drawing heavily on my personal experience of performing the routine task, a task that I shared with the Documentation Officer (DO). In the account presented in this thesis, I have set out what we understood of context and how we applied this understanding in our use of the records and interpretation of the information content through contextualisation. It was not possible to reconstruct the routines that shaped the documentation records, but we discerned aspects of these routines from patterns in the discrepancies that we encountered (Section 5.7). In addition, we built a picture of the provenance and chronology of the records (Section 4.6). More broadly, we applied our understanding of contextual factors common to all the records: the way that archaeological material decayed and was conserved, and the overall development of associated knowledge of the finds (Section 4.2).

My analysis showed that different elements of context influenced interpretation in different ways. A key finding was that while our understanding of provenance (when, where, why and by whom) was significant for comprehending the chronology of the records and their purpose, understanding how the information content was created was equally important. In the majority of cases, these elements were integrated into an overall understanding of context: for example, how the creation of records involved the use of previous records, and

this intersected over time with material changes in the artefacts and other activities such as conservation treatment (Section 6.7).

The rest of this final chapter discusses the temporal mobility of the documentation records, looking at the characteristics of the records that facilitated their reuse after a long span of time. This is followed by a discussion of the role of context in temporal mobility. The discussion concludes by looking at how we developed our understanding of context when very little contextual information was provided with the records. Lastly, this chapter closes with consideration of the implications of this study, including implications for the original practical problem.

7.1 Temporal mobility: Standardisation and selection

Information resources are created with the 'trajectory of use' (Ackerman and Halverson, 2004) in mind. The process of packaging (Bannon and Bødker, 1997; Hertzum, 1999; Markus, 2001) is a translation effort because it involves shaping information content to ensure interpretive flexibility for future users. This ability to cross temporal boundaries, or temporal mobility, can be incorporated at the time of creation when the information content is packaged.

Our use of the records for the identification of finds was not far removed from the original purpose of the records, but the ability to do this many decades after the records were created can be viewed as an example of temporal mobility and interpretive flexibility. The context in which we were working and our task was related to curatorial work, but we were not curators ourselves, neither were we Anglo-Saxon specialists. However, the format and structure of the records were well suited to facilitate use after the passage of time. In the

first instance, the records had survived, apparently intact, and in the case of the grave records, had survived for several decades. Apart from occasional annotations on the finds cards, and the occasional stapling of a conservation receipt, the records were also apparently unchanged. This physical stability, which includes retaining evidence of amendment, contributes to the temporal mobility of the records.

Information content had been 'packaged' to be consistent so that the same types of information were recorded for each find and represented in a consistent way. This standardisation of information content was a form of packaging that contextualised the information, thereby facilitating temporal mobility. A standardised structure establishes a stable interpretive scaffold that provides definition and clarity by reducing 'multivoicedness' (Hertzum, 1999). This can facilitate the dissemination of information to multiple groups so long as users are familiar with the shared language of the structure (Fiedler and Welpe, 2010; McKinney and Yoos, 2010). Standardised modes of recording also reduce cognitive load for the user because information is presented in a predictable way. This means that the interpretation of content is less effortful (Hertzum, 1999; Fiedler and Welpe, 2010). So codified information can be decontextualised and then recontextualised in a new context – a pre-existing structure such as a database (Tuomi, 1999).

The St Thomas records were not only internally consistent, but also the same standardised approach was consistent across the phases of documentation. The ability to find relevant records and information quickly and easily was particularly significant for us because our use of the records required extensive cross-referencing and we were working within time

constraints. We quickly learned to use the records because we recognised the common features, such as the types of information recorded.

The recording of information in the documentation records was highly selective, and this enhanced clarity because we could make use of the content without having to first extract it from accompanying exposition. This selective approach was attuned to the purpose of the record. For example, during the first phase of documentation, the grave records aimed to document the excavation of each grave, while in the second phase, the card index aimed to document each find. This differing purpose was reflected in the types of information recorded and the exclusion of extraneous information, resulting in minimal, highly edited records (Section 5.3).

There were occasional examples of recorded information that we were unable to interpret. For example, Figure 39(a) shows a label annotated with a letter 'B'. We encountered other labels annotated with capital letters, but these letters did not appear to correspond to any other records that we were using. Figure 39(b) shows line drawings from a finds card where some areas have cross hatching. Again, we were unable to understand what this represented. The cross hatching could have been omitted without reducing the efficacy of the drawings to convey size and shape. The selective recording of information was expedient. However, this came at a cost, because, decades later, additional information could be important clues to help us develop our understanding of the context of creation, such as additional comments on condition in the finds cards. Furthermore, brevity could be taken too far, as we found when catalogue information was too sparse or generic to be useful and not enough to identify the find.

(a) 

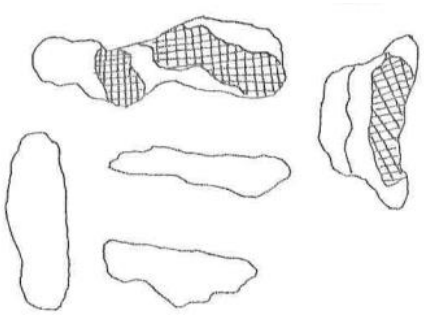
(b) 

Figure 39: (a) Label for find 25 from grave 161; (b) Line drawings from finds card for find 8 from grave 134.

The removal of extraneous information also resulted in records with very limited scope for conveying uncertainty, ambiguity or speculation. For example, comments that appeared in the card index such as 'it would appear to have had a hook at one end' were omitted in the catalogue.[38] This was therefore a trade-off between improving clarity and flexibility at the risk of losing information that could otherwise weigh down the document but could also convey useful associated information and nuance. This had implications for us when performing the accessioning task. Museum A's CMS was designed to avoid ambiguity and exposition, so there was little scope for us to record the context in which we created the CMS entries. For example, we could not record our understanding of the other documentation records, or express uncertainty over the identification of finds.

So, while information can be stripped down for improved mobility and interpretive flexibility, this is at the expense of what Daft and Lengel refer to as 'richness' (Daft and Lengel, 1983). Daft and Lengel proposed that different modes of communication were suited to different degrees of richness, where richness refers to the ability of an information

[38] Speculative comment from the finds card for find 28 from grave 161.

resource to convey information (Daft et al., 1987; Daft and Lengel, 1986, 1983). The limited capacity for structured information resources to convey nuance means that these resources function well in well-defined scenarios, such as to provide 'recipes' to solve common problems (Gray and Durcikova, 2005; Tsoukas and Vladimirou, 2001), or in this case, for the identification of museum artefacts. However, there is a risk of 'irreversibility' whereby the information structure is characterised by inertia and inability to adapt to changing needs (Bowker, 2000a; Hanseth et al., 1996). The use of rigidly structured information resources may be limited to predictable situations which quickly become commonplace, at which point the information resource may cease to be useful, such as the Xerox documentation which Orr's photocopier technicians openly mocked since it was only relevant in the most straightforward situations (Orr, 1996). Rigidity can restrict flexibility to the extent that it stifles creativity and innovation (Galliers and Newell, 2001) and may result in the organisation being locked into a particular state (McKinney and Yoos, 2010).

At Museum A, the 'locked in' nature of the data on the CMS may have contributed to the reluctance to accession archaeological artefacts until after publication of the catalogue had established the authoritative interpretation. The lack of scope for ambiguity in the documentation record meant that one interpretation had to be selected over others. In STS literature, this is referred to as 'stabilisation', which results in 'closure' through collective acceptance of some statements over others, and communally agreed shared meaning where alternative views are excluded (Latour and Woolgar, 1986; Pinch and Bijker, 1984; Van House, 2004). This view on the construction of knowledge applies to communities in general: a document provides stability because it focuses on an agreed meaning (Fish, 1980). Furthermore, when meaning is collectively agreed then there is less need to record

associated contextual details because the 'facts' can stand on their own (Latour and Woolgar, 1986). Stabilisation therefore requires the codification of some information rather than alternatives.

As well as archaeological interpretation being locked in, we found that errors could become locked in, for example when a small error in notation on a label was transferred to the numbering on an illustration (Section 6.6.1). The long-term nature of museum documentation could be a source of anxiety – the DO talked about the responsibility of creating and maintaining the CMS records – because the point of use for the records that we created was at some unspecified future time. In her case study of documentation at the Smithsonian Institution, Turner cites a memo to documentation staff: 'If you get tired or confused, stop and rest; when mistakes are made, it may take another hundred years to find and correct them' (Turner, 2016, 170). During the documentation task, we occasionally needed to deal with the legacy of errors made by our predecessors.

7.2 Hierarchical arrangement and grouping

The documentation records were also standardised in their hierarchical arrangement, an arrangement that was also seen in the way the artefacts were stored: documentation records and artefacts were organised by grave number and then by find number. This meant that it was easy to find information on a particular grave or find, and easy to tell if any records were missing or incomplete. Records from all phases of documentation were arranged in this way. This standardised, hierarchical arrangement, a consistent feature of the structure of the records, was another form of packaging that contextualised the information, thereby facilitating temporal mobility. Identification of the pieces of information content and associations between them was conveyed by grouping and sequence, so that, just as the

physical arrangement of books in a library helps readers find the right book, the arrangement of information in the documentation record was informative for us.

The contextual significance of the arrangement of information resources is a core element of archival theory and practice. Archival science and the allied discipline records management both aim to 'identify, preserve and provide access to documentary heritage' (Gilliland-Swetland, 2000, 2). The purpose is to maintain the evidential value of records, primarily for organisational use, and secondly for the use of historians and researchers. This is achieved by selection (known as appraisal), and a combination of time-limited retention for some records and permanent preservation for others (Thomassen, 2001).

The theoretical basis for archival and records management practice is the concept of 'respect des fonds', which can be traced back to 1841 and the edicts of administrators of the French civil service (Duchein, 1983). The principle is that to understand a record it is essential to understand the context in which it was created, so a record cannot be viewed in isolation because its meaning comes from its administrative context. In practice, this means preserving the 'fonds' as an archival entity, being the entire body of records from a particular organisation, group or individual, in its original order (Cook, 1992; Gilliland-Swetland, 2000). Respect des fonds and the maintenance of original order is an expedient and effective way to facilitate access by maintaining hierarchical filing structures. Assuming that records were originally maintained in a structured and logical way (which was not necessarily the case, see Barrett, 2013), maintaining this structure avoids the needs for item-level archival description since records can be described by group (Gilliland-Swetland, 2000).

The significance of hierarchical arrangement was also inherent in the structure of the CMS, even though the digital documentation records were searchable and so could be sorted and rearranged in multiple ways. The sequence in which we accessioned the artefacts was therefore intended to match the sequence in the catalogue, and associations, where related artefacts were grouped under the same accession number, were maintained wherever practicable. For the archaeological artefacts, grouping and sequence were important representations of interpretation because artefacts that were considered to be parts of a previous composite whole were grouped together, for example, the fragments of metal fittings from a wooden box. The grouping of these items was therefore not just expedient but also a valuable way of representing their meaning, and therefore an important contextual element, as important as the hierarchical arrangement.

7.3 Role of provenance and routine in temporal mobility

Temporal mobility requires interpretation of records after the passage of time, and this requires translation effort on the part of the recipient. This study has shown that this translation effort is greatly facilitated by an understanding of the context in which records were created. The explicit contextual information available to us was sparse and fragmentary and consisted primarily of what we could piece together from associated documents at Museum A. However, over the course of my fieldwork we gradually developed an understanding of the chronology of the records, when and where, by whom they were created, and why, that is, their provenance.

Along with original hierarchical arrangement, provenance is the other key element of respect des fonds, whereby records are identifiable if they are preserved with records from the same source, typically an organisational group. However, this assumes that

organisational hierarchy has a stable, functionally defined structure, and the limits of this approach has long been recognised by the archive community. Respect des fonds does not reflect the complexities and dynamics of organisational work such as cross-functional collaborations, and the fluidity of organisational structure (Barrett, 2013; Bearman and Lytle, 1985; Hurley, 1995).

To account for this, 'new provenance theory' requires consideration of function and activities, rather than being confined to organisational hierarchies and jurisdictions (Eastwood, 2000; Upward and McKemmish, 1994). This is one of several 'post-custodial' shifts in archival theory partly in response to the impact of digital media and the vast quantities of records generated by post-war bureaucracies, but also postmodern questioning such as the role of archivists in the construction of cultural memory (Gauld, 2018, 2017; Gibbons, 2019; Schwartz and Cook, 2002). Records appraisal no longer consists of assessing the value of individual records but may involve 'macroappraisal' where the overall functions of an originating body is considered and records are selected that are representative of those functions (Bailey, 1997; Cook, 2004). The overriding concerns are not only the selection of valuable records for retention and preservation, but the provision of access to those records. Access is viewed in terms of retrieval, that is, can the user find records that are relevant to them (for example see Lytle, 1980; Lytle and Dürr, 1980). Provenance is considered to be key to facilitating retrieval in the long-term.

When using the St Thomas records, retrieval was not a primary concern of ours, but our understanding of provenance was important for establishing a rough chronology of the records. Timing was critical to our understanding of the changes that affected the information content, specifically the impact of material changes in the archaeological

artefacts, and interactions with activities such as conservation treatment and scientific analysis (Section 4.2).

Similarly, the details of who created the records was not as significant as their role and background, for example, we made assumptions about the practice of those two created the illustrations because they were professional artists. There was no specific benefit from finding out the names of the individuals, or the address of their place of work, but it was relevant to find out that they were not based at Museum A, and as a result the artefacts were dispatched to them. Overall, specific provenance was not as significant as understanding the relative provenance of the records, in terms of where, when and by whom records were created (Section 4.6).

However, our understanding of functional provenance needed to be more specific because the different set of records were created for ostensibly the same purpose: the documentation of the St Thomas artefacts. Our understanding was that with each phase of documentation, the artefacts were recorded for a different reason and the resulting records served a different purpose to the previous records. These differences accounted for differences in the types of information that were recorded and differences in the information content. Our understanding of the different circumstances in which the records were created, at different times and for different reasons, therefore enabled us to interpret them differently.

As well as understanding the provenance of the sets of documentation records, understanding how the records were created played a significant role in our use of them. It was not possible to reconstruct the actual routines that led to the creation of the different records, but an understanding of the different aspects of routine helped us to understand

how discrepancies between the records came about. This was particularly significant because differences could be substantive but easily accounted for once we came to an understanding of how they were created.

Our understanding was that, in the majority of cases, these records documented the physical condition of the artefacts at the time of documentation according to the associated knowledge of the finds at that time. As soon as the artefacts physically changed, either through natural deterioration of the archaeological material or as the result of conservation treatment, or as soon as associated knowledge changed, the documentation record because obsolete because it was out of date. The processes of updating and interpretation were therefore both important factors in the shaping of the information content (Section 5.4; Section 5.5). This broad understanding accounted for many of the discrepancies that we encountered in the records enabling us to reconcile them even when the information content differed. In archival science and records management, the future use of records is seen in terms of accessibility and retrieval, rather than actual use and interpretation. Provenance is key to this, but this study has shown that understanding how records were made by what process or routine, can also be significant, if not more so.

7.4 Use of context to inform interpretation

The way that we applied our understanding of context when using the records reflected the conditions of that use. The accessioning task required us to cross-reference the records extensively, matching the information between records, and with the actual artefacts. We therefore frequently used the entire corpus of records and finds as an assemblage, and so understanding the relative distinctions between them was more significant than establishing specific details of provenance. Our main purpose in using our understanding

of context was explanatory, to explain differences between the records, rather than to interpret the meaning of content. So, if there were aspects of content that we did not understand, this was less important that understanding why content differed between records.

Since we viewed the assemblage of records as a whole, while different aspects of context influenced our use of the records in different ways, they were not viewed in isolation but formed a coherent view of an overall chronology. As we gained experience of the records, we not only developed explanations for the differences but grew accustomed to regularities in the ways that they differed, such as the Curator's choice of names for finds, or her rationale behind numbering and sequence. Our familiarity with these patterns reduced the effort required for the accessioning task.

Once the majority of differences could be satisfactorily explained the accessioning task required less effort. We were able to disregard most of the differences. Recognition of the patterns also meant that we developed a tolerance for difference to a certain extent. This made us sensitive to anomalies that required further attention. When discrepancies deviated from these patterns our performance of the accessioning task was more effortful because we applied our understanding of context to match the records to the finds and explain the apparent discrepancies. Sometimes this led us to reconstruct specific isolated events, such as a mistake in notation on a label (Section 6.6.1). At other times we constructed a more elaborate biography of the interactions between finds, the documentation records, and how these intersected with other events such as conservation treatment (Section 6.6.2).

Our understanding of context also played a role in our perception of the relative credibility of the different records. This was relevant when dealing with more complex cases that required us to consider many alternative explanations for discrepancies. Information behaviour studies of the evaluation of the credibility of information resources have found that while trust in a credible author affects the assessment of credibility, the perceived quality of the information and its presentation is also significant, for example, dimensions such as accuracy, consistency, scope and timeliness (Fritch and Cromwell, 2001; Hilligoss and Rieh, 2008; Kelton et al., 2008; Lucassen and Schraagen, 2011; Meservy et al., 2019). So, while our understanding of provenance was too broad to have much influence on our perception of credibility, our understanding of how the records were created did. The documentation records were all perceived as relatively credible because we understood that most information was obtained from direct observation of the artefacts, but credibility of the different records varied. For example, our understanding of context had an adverse effect on our perception of the credibility of the numbering on the illustrations, because this numbering was apparently copied from the labels which were often found to be mixed up or missing.

7.5 Building an understanding of context

When we started the accessioning task, our contextual understanding was limited, but this developed as we became more familiar with the records and learned to recognise patterns in the information content and the differences between records. However, our understanding of context was incomplete, partly because there were limits to what could be inferred about the creation of records decades ago, but also because there were limits to the time available for investigating the associated documents at Museum A, or exploring other avenues, such as the records in the Conservation Department. This expedient

approach extended to our performance of the accessioning task, since the DO was keen to complete the task within timescales that she had planned. This meant that we did not attempt to explain all of the discrepancies, and we did not aim for 100% certainty. Instead, we would complete the accessioning of an artefact as soon as we were confident that we had identified it and the associated records, even if some discrepancies were unexplained or uncertainties remained.

In this context of use, having comprehensive information about the circumstances of creation for all of the records was an unrealistic goal, but also a potential hindrance because successful, timely completion of the accessioning task hinged on the associated cognitive load. An overview of context which enabled us to understand how the records related to each other was mostly sufficient and appropriate for our needs. It also reflected the limits of what we could expect to discern. In particular, it was very difficult to explain discrepancies that could have resulted from random occurrences, that is, accidents. It could be equally difficult to explain discretionary events, such as curatorial decisions. Overall, it was easier to reach satisfactory explanations for the predictable patterns that we encountered.

How did we develop our understanding of context? We began the accessioning task with only a nascent chronology, passed to the DO by her predecessor. This was enough to provide some background to the archaeological site and some of the subsequent events. We gradually supplemented this with whatever I gleaned from the associated documents at Museum A. The documentation records, associated correspondence and other artefacts such as photographs, X-rays, plans, were not archived or catalogued as far as we knew, so there was no formal record that might have provided details such as date of creation, or a

description of contents. However, these associated documents provided a partial account of the chronology.

For the rest of our understanding of context we drew on our combined knowledge and experience of the museum setting and practice, in particular, documentation practice and conservation practice. During the accessioning task, we married the expectations and assumptions that stemmed from this understanding of museum practice with our experience of working with the documentation records. This contributed to our understanding of how the records were made. For example, my experience of archaeological conservation was directly relevant to our interpretation of the line drawings on the cards in comparison with the illustrations since I was able to judge the likely extent of change in the artefacts. The DO had studied archaeology (although had no experience of fieldwork) and had considerable experience of museum documentation.

While our combined experience of museum practice contributed significantly, our ability to understand the origins of the records was limited, because we were neither curators nor Anglo-Saxon experts. Furthermore, our understanding of how the records were created remained speculative, simply because we had no knowledge or experience of practice from decades ago. The practices of archaeological and curatorial communities have changed over the past fifty years since the St Thomas site was excavated. For example, since the 1980s, archaeology in the UK has become professionalised (Darvill, 2012; Davis, 1982) and best practice for the recording of archaeological sites is now standardised in line with European guidelines (Perrin et al., 2014), with more consideration for aligning recording systems with those of the planned place of deposit (Brookes, 2017; "CIfA regulations, standards and guidelines" 2014; Fernie, 2017). Similarly, the creation of these

documentation records pre-dates the Spectrum documentation standard that was first published in 1994.

7.6 The routine as boundary object

These changes highlight that temporal boundaries can develop within communities as practice and shared knowledge develops. However, while this gap in time meant that we could only speculate about the creation of the records, we expected the fundamental principles of documentation to be the same, and we recognised this in the format and structure of the resulting records. For example, we recognised the types of information that were recorded, and the consistent, structured mode of recording as characteristic of documentation records, and this led us to make assumptions about how the records were created. This suggests that the documentation routine was itself a boundary object, which was sufficiently generalised to be comprehendible across boundaries, including the temporal boundary.

In this study of museum documentation, boundaries were blurred. For example, the Curator had practical experience of archaeological fieldwork having worked on the St Thomas excavation. Furthermore, she had been drafting the excavation report aimed at the external archaeological community. Contribution to the archaeological community by a curator at Museum A was not exceptional and I encountered numerous curators from other departments at Museum A who regularly undertook archaeological fieldwork. These individuals occupied archaeological, curatorial, and sometimes academic communities, apparently at the same time.

The DO exemplified someone who regularly spanned boundaries at Museum A. She was a member of the curatorial department and was therefore part of that community, but she was non-curatorial and so remained a relative outsider. She was not an archaeologist but had studied archaeology (Roman, rather than Anglo Saxon) at university. She was also a relatively new member of staff, having joined Museum A within the past two years. Her role as DO spanned boundaries out of necessity since she was not part of a recognised group at the Museum. This meant that she lacked an identifiable group of documentation peers but instead had a network of colleagues with shared interests. This is characteristic of individuals with a brokering role (Wenger, 2000) who can become marginalised because they are not fully aligned with one particular community (Brown and Duguid, 1996), but also characteristic of information workers engaged in the invisible work of infrastructuring (Star, 2002; Star and Strauss, 1999).

The blurring of boundaries stemmed not just from the way individuals occupied and spanned multiple groups but also could be seen in the shared concern for the care of Museum A's collection. This shared concern cut across boundaries and formed the basis for common ground between groups and communities. The need to identify artefacts from the museum collection and identify their location was of concern to anyone who worked directly with those objects. Documentation was therefore a common concern for multiple groups, not just the curators, but also collection managers (who had responsibility for managing the galleries and stores), conservators, and any staff involved with exhibitions and events, loans and gallery displays. Consequently, the documentation task was common to these groups, and so the ostensive documentation routine can be seen a boundary object that is recognisable to all.

7.7 Implications

It is problematic to generalise from ethnography due to its qualitative, interpretive nature (Hammersley and Atkinson, 2007; Prasad and Prasad, 2002). This is particularly the case with autoethnography which draws heavily on subjective personal experience. Furthermore, information behaviour is highly context-specific (Fisher and Julien, 2009), as are the specific details of the micro-analysis of a routine (Becker and Zirpoli, 2008). Museum A cannot be considered to be representative of museums with documentation backlogs, just as St Thomas cannot be considered representative of archaeological sites. However, generalisability emerges when the findings are intertwined with the literature, and through the use of theoretical framing to interpret the findings (Eisenhardt and Graebner, 2007). Having connected my findings with the literature, I conclude this thesis by drawing out a few themes for further development.

'… there is no such thing as pure data. You always have to know some context. And as you develop metadata standards you always need to think about how much information you need to give in order to make your information maximally useful over time' (Star and Bowker, 2010, 238). To illustrate this point, Star and Bowker use the example of lake water acidity measurements that are affected by the technology used to take the measurement, and whether this is done immediately at the lake or later in the lab. However, as Shankaranarayanan and Even point out: 'metadata requirements are complex and difficult to capture, implementation is demanding, the end result is rarely satisfactory, and enhancements or corrections require significant effort, as metadata layers are deeply embedded in systems' (Shankaranarayanan and Even, 2006, 88).

Metadata provides context for information content, and while many different types of metadata have been identified, with many different roles and functions (Cumming, 2007; Dempsey and Heery, 1998; Duff, 2001; Niu, 2013; Sen, 2004), user requirements are underspecified. Archival science, records management and data management remain focused on facilitating retrieval with an emphasis on descriptive metadata and provenance (Carata et al., 2014). While this may answer the question 'where does the information come from?', the St Thomas study has highlighted the significance of understanding 'how did it get here?'.

Foshay et al's research found that data warehouse users valued metadata that provided contextual information about data quality, unlike data warehouse managers who valued descriptive metadata, for example, Dublin Core (Foshay et al., 2007).[39] This suggests that users value contextual information that helps them interpret data, rather than just find it. User perceptions of the dimensions of data and information quality have long been studied in information behaviour and information systems research (Bai et al., 2004; Nelson et al., 2005; Shankaranarayanan and Blake, 2017; Wand and Wang, 1996). Many of these dimensions: accuracy, completeness, timeliness, bias, consistency, can be understood by understanding how the information or data was created. For example, aspects of the St Thomas documentation routine were associated with the creation of information resources that were up-to-date observations of the artefacts, complete and consistent. Further work could explore the connection between the mode of creation of the content and resulting

[39] Dublin Core is a metadata standard developed primarily to describe online resources (Roberts, 2004).

data quality dimensions. This could have implications for the creation and management of end-user metadata that facilitates the interpretation of information and data content.

This study of museum documentation explicitly linked the interpretation of the record with an understanding of how the record was created. This has implications for Pentland and Feldman's model of routines, where ostensive and performative elements interact with artefacts (Pentland and Feldman, 2005). The specific implication is that the artefact, in this case the documentation record, was shaped by the routine to the extent that traces of the performance could be discerned in patterns in the information content. In some cases, we made inferences about performance by interpreting the records. This merits further study since it has implications for our understanding of the interplay between performance and artefact. This could also have implications for metadata management as it suggests that quality dimensions may be captured by the representation of routines, patterns of action, and deviations from those patterns.

Finally, in this study, the documentation records had temporal mobility, but the documentation routine was also apparently temporally mobile. As documentation practitioners, we can recognise the concerns expressed by Evison in her account of the documentation of her archaeological fieldwork in the early 1950s (Evison, 1987, 1956): expedient, practical but methodical and detailed, with a concern that nothing should be missed, with every archaeological find measured, described and sketched. The documentation routine was common ground between us, the Archaeologist and the Curator even though the circumstances of the routine varied. Routines as boundary objects is another area for further research as it has implications for the role of routines in the coordination of distributed collaborative work, and work across temporal divides.

7.8 Implications for museum practice

In this study, there were many factors that caused the museum documentation task to be effortful: the labels were sometimes mixed up or missing, sometimes the records were divergent in ways that we could not explain. However, despite all the difficulties, the most straightforward cases, regardless of the extent and multitude of discrepancies, were artefacts that were distinctive in some way – a recognisable type of object or unusual material. This was an underlying factor in all our difficulties: the nature of the archaeological material that was often very similar, fragmentary, and without distinguishing features.

The implication is that museum artefacts that are intact and recognisable as 'teapot', 'basket' or 'spade' are more readily named and therefore more readily identifiable, even if the significance of these artefacts is not well understood. While there are debates around terminology (spade, shovel, or digging implement?) that can have profound implications for interpretation and meaning (Johns, 1996), the finds from St Thomas relied on interpretation from an archaeological or curatorial specialist to determine what they were and therefore what they should be named. This interpretation was not stable.

Furthermore, the numbering, grouping and sequence of the artefacts was also unstable. These factors reflect how the finds had been interpreted and also influence how they would be interpreted in future. Addressing the fundamental question of what constituted the accessioned artefact (part of a previous whole, and if so, in what way?) was a requirement of the accessioning task, and once finds were numbered and entered on to the CMS this could not be changed. It was not an option to enter provisional numbering, but this creates tension when archaeological knowledge is nascent. When knowledge associated with a

teapot (such as provenance, artistic merit, or production technique) is revised or developed the artefact can still be named as 'teapot'. Whereas this study has shown how the names used to identify archaeological finds could change significantly as understanding of them developed. The same applied to numbering and grouping.

At the time of my fieldwork, the curatorial departments at Museum A were actively engaged in clearing documentation backlogs, but curatorial tenacity in maintaining high standards of documentation was seen by other groups at the Museum as intransigence. This was seen not only in delaying accessioning until after cataloguing and publication, but also in a preference for a thorough approach to documentation, exemplified by the St Thomas documentation project where each find was accessioned individually, and each CMS entry populated with curatorial information. The Spectrum standard suggests prioritising expedience over rigour by carrying out a basic inventory first and then returning later to populate records with catalogue information. However, inventory is potentially not straightforward, as seen in this study, because basic identification of archaeological finds with numbers and names was far from a mindless predictable task. The apparently routine identification of finds was interpretive and effortful. Where identification is in doubt Spectrum also proposes the use of temporary numbers so that provisional identification can be recorded. This would defer the need to address legacy records, in which case the temporal mobility of the records becomes a critical factor in the success of eventual documentation efforts. This highlights the need for active management of these records so that contextual information is retained.

Finally, this study also highlights the need for boundary spanning information management roles in museum documentation. Intermediaries such as the DO are valuable for their

understanding of the Spectrum standard and its application. However, they are also experts in the documentation routine, which this study suggests is a boundary object. This expertise places them in the key position of being able to translate the requirements of disparate groups at the museum, as well as interpret the information resources created out of performances of the routine in the distant past.

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