Materiality matters: exploring how archivists engage with, and represent, textile pattern books digitally

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Abstract

Archive services devote considerable resources to digitising collections and collection metadata, transforming public access and raising awareness of the wealth of records available for research and enjoyment. However, digital access predominantly focuses on document content and fails to effectively communicate the form, construction and tangibility of records, as well as the physical evidence they embed about their creation and career. Using textile industry pattern books as a case study, this thesis examines why the material features of archives matter and explores how archivists engage with materiality in their practice. It undertakes an analysis of archival theory and methodology to identify reasons why materiality receives limited attention in professional discourse. Through seven institutional case studies and learning from analysis of the Humanities community's digital practices, the thesis asks how archivists can create effective, material-centred, digital access to pattern books. The research provides compelling insights into the significant contribution physical evidence makes to the interpretation of textile heritage. It highlights that accessible digitisation techniques, such as angled shots or photographing a group of boxes, effectively communicate physicality and context, while linked data supports collection discovery and reveals unexpected relationships. The findings emphasize the digital divide which exists in the archive sector and identify that many services are held back from fulfilling their digital aspirations by a lack of capacity and resources, more so than by access to technology. The thesis adds to the growing body of evidence of the ways in which materiality builds connections, informs the interpretation of function, use, provenance and context, and underpins archival practices in exhibition-making and engagement.

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Author’s declaration

I declare that, except where explicit reference is made to the contribution of others, this dissertation is the result of my own work and has not been submitted for any other degree at the University of Glasgow or any other institution.

Abbreviations

A2A	Access to Archives
ARA	Archives and Records Association
ASC	University of Glasgow Archives and Special Collections
GLAM	Galleries, Libraries, Archives and Museums. This acronym is employed as shorthand for the cultural heritage sector.
GSA	Glasgow School of Art
HLF, NLHF	Heritage Lottery Fund, renamed National Lottery Heritage Fund
HMC	Historical Manuscripts Commission
ICA	International Council on Archives
ISAD(G)	*General International Standard Archival Description*
ISAAR(CPF)	*International Standard Archival Authority Record for Corporate Bodies, Persons and Families*
NHM	Natural History Museum
NLS	National Library of Scotland
NRS	National Records of Scotland, formerly National Archives of Scotland
RiC, RiC-CM	*Records in Contexts Conceptual Model*
PRO	Public Record Office
SCAN	Scottish Archive Network
TNA	The National Archives UK
UofG	University of Glasgow

Definitions

Archives, documents, records

In archival literature, the term 'archives' is used to describe both spaces in which documents are managed and stored long-term and the accumulations of documents themselves. For clarity, in this thesis, 'repository' is used for the storage site and 'archive service' or 'institution' for the organisation managing it. Although archival theory differentiates between 'archives' and 'records', here 'documents', 'records' and 'archives' are used interchangeably to refer to archive collections.[1]

Archivist, custodian

Pattern books and other textile company archives are preserved in archive repositories, museums, galleries and libraries, held by Further/Higher Education institutions for teaching purposes and retained by manufacturers for ongoing use. The discussion in this thesis is from an archival perspective and refers to archival theory and practice, but it adopts the ICA *Code of Ethics*' approach of using 'archivist' as a term 'to encompass all those concerned with the control, care, custody, preservation and administration of archives' (International Council on Archives, 1996, p. 1). 'Custodian' is used where the discussion explicitly refers to curators and librarians as well.

Medieval manuscripts, manuscripts

Humanities scholars and Special Collections librarians use '(medieval) manuscripts' as a shorthand to refer to literary, scientific and religious texts in codex form. This usage has been adopted for the thesis, because it examines this community's curation and material-centred research practices for these record types. Where the thesis refers to the financial, legal and administrative medieval records commonly found in archive repositories, this is made explicit.

Readers, researchers, users

Archivists generally employ 'user' to refer to individuals who access collections for research and other purposes. This thesis uses 'user', 'researcher' and 'reader' interchangeably.

Textile heritage collections, textile collections

Textile manufacturing heritage encompasses paper records, equipment, buildings and fabrics. Unless otherwise specified, 'textile heritage collections' and 'textile collections' refer to textile manufacturing company business records and associated textiles.

West of Scotland

This comprises the historic counties of Ayrshire, Dunbartonshire, Lanarkshire and Renfrewshire.

[1] C. Williams (2006a, p. 5) defines records as 'the products of current and ongoing activity' and archives as a subset of those records, retained for their long-term value. But she acknowledges that these distinctions are blurred and not applied uniformly by the sector.

Embodying

This glamorous fabric was declared ‘on trend’ in 1968. Its metallic threads and synthetic fibres reflect the Space Age’s enthusiasm for technology, science and innovation, while the design embraces contemporary fashion’s exuberance. Made up into a garment, the fabric’s sheen and texture would set up a dynamic play of light across the surface as the wearer moved. Yet, the context of this fabric sample within a trendspotting guide for textile manufacturers warns that this pattern might never have been woven commercially. Textile manufacturers’ pattern books present a similar conundrum of promise and mystery as to whether, where and how any one pattern was used.

Figure 1. Sample of metallised matelassé jacquard fabric, Bilbille & Co., 1968 (private collection)

Introduction

The shiny matelassé fabric sample on the preceding page encapsulates evidence for marketing practices, fashion trends and the adoption of new fibres in Western European textile manufacturing in the 1960s, but to interpret that evidence, the viewer requires knowledge of its physical and intellectual context. The fabric is one of thirty-seven samples published in a catalogue in June 1968 by French textile sampling house and trendwatcher Bilbille & Co; their catalogues, disseminating French couture, were distributed to subscribing textile manufacturers and fashion houses. The sample's bold, colourful design imbues 1960s' fashion. Its manufacturer had embraced the latest innovations in fibres, as it contains polyamide, which had only been brought into commercial production the year before the sample was woven. Touching the cloth reveals the scratchy texture of its gold metalloplastic yarn. Examining the catalogue, the viewer sees that the matelassé sample is showcased on a dedicated page, which it nearly fills, and that the catalogue contains both flamboyant and muted fabrics. All this data is available to the viewer who studies the physical catalogue, but absent for those who only access the photograph overleaf, which decontextualises the sample and masks its physical qualities. Critically, to evaluate the fabric's contribution to fashion history, the viewer, whether accessing the sample physically or digitally, needs to understand the function of Bilbille & Co.'s catalogue as a trend prediction tool. While Bilbille may have predicted a bright future for this matelassé fabric, the catalogue does not reveal whether this pattern ever went into production. Research into contemporary manufacturers' pattern books, fashion catalogues, surviving garments and photographs would be required to try and establish its destiny.

Pattern books from Britain's historic manufacturing industry are, like the Bilbille catalogue, a vast repository of information and material evidence about manufacturers' designs, processes, use of technology, choice of textiles and their workers' skills. Combining textual data and fabric samples, pattern books were used to deliver a range of functions, from initial design development, through production, to sales and stock control. Today, researchers find them valuable sources for studying historical business practices, while heritage scientists analyse the fibres and dyes to recover lost knowledge about weaving and dyeing, and creatives use them as springboards for artistic works. Unfortunately, only a fraction of the pattern books and corporate records (minutes, financial and operational records) created by manufacturers in the course of their business have been preserved. Corporate records were routinely destroyed when a business was

closed or sold, so few comprehensive archives remain. A proportion of nineteenth-century pattern books were preserved, because they were reused by other manufacturers, repurposed as teaching aids or acquired by museums as design artefacts. But when the textile manufacturing industry collapsed in the early twentieth century, there were no industry buyers, museums could only absorb a small subset of the abandoned records and archive services were largely non-existent, so thousands of records were discarded (Sykas, 2005). The pattern books which have been safeguarded in archives and museums present physical and intellectual challenges to their custodians. The volumes can be awkward to store and handle. Industry-specific terminology describing obsolete practices and ingredients makes the records' function obscure to non-specialists, while the physical evidence the textiles convey about their composition and manufacture is only accessible to those who can decode it. Standard overhead digitisation methods fail to do justice to the colour and texture of the fabrics. As a result, heritage professionals and especially archivists, few of whom are textile experts, find pattern books difficult to catalogue and digitise. This project concentrates on the archive sector and asks how archivists might effectively describe and digitise these records and textiles, where 'effectively' means good enough for them to be managed, used and appreciated as materially-rich artefacts.

This research project arose from the author's experience of digital resources as a professional archivist. During her career, she has observed the exponential growth in archival digitisation, digitised records herself and assisted researchers to use digital representations of physical records. She perceived that digital representations often fail to communicate records' artefactual qualities and consequently, that researchers are unable to interpret material evidence digitally. Catalogue descriptions rarely fill the gap by describing a document's size or appearance. Through her involvement with the sector, the author witnessed archivists engaging with archives' physicality and material evidence in their practice, but she did not see practice-based knowledge being incorporated into standard digitisation approaches. The author therefore decided to investigate the reasons for this gap. To examine the issues, she used West of Scotland pattern books as a case study. The visual appeal of pattern books makes them popular candidates for digitisation, but their complex materiality is awkward to convey digitally. Initiatives by archivists at the University of Glasgow to describe physical features of pattern books demonstrated that there was sector interest in communicating their materiality. Also, recognising that the region's once extensive textile industry has largely disappeared from public consciousness,

the author wanted to use the project to showcase the industry's fascinating archival remnants.

The project aimed to develop an understanding of archivists' engagement with materiality and identify effective methods for communicating the material properties of pattern books in the digital sphere. It addressed two primary research questions, 'Why do the material features of archives matter?' and 'How do archivists engage with archives as material artefacts?', and two secondary questions, 'How can archivists describe and digitally image pattern books and textiles to effectively represent and communicate their material properties and physical context?' and 'What are the affordances of the digital sphere for pattern books?'. To address these questions, the author reviewed literature relating to archival materiality, digital representation and access, and textile heritage research. She investigated why archival structure and archivists' materially-aware practice have received limited attention in archival studies and demonstrated how pattern books' material features inform their interpretation (chapter 3). She undertook case studies examining description, digitisation and digital access activities within seven heritage institutions, to understand their aims, operating context and approach to materiality (chapters 5 and 6). To learn what digitisation could offer, she reviewed heritage projects which had utilised digital technologies to interrogate heritage artefacts' material features (chapter 4). She also studied a growing literature advocating for greater material awareness in all aspects of professional archival practice. Its authors – archivists, conservators and archival researchers – argue that archives' material qualities underpin the interpretation of provenance, creation and career, shape user interaction, foster connections between past and present users, and provoke engagement which is intellectual, sensory and affective. Some also argue that records' former physical context – where they were stored, what they were stored alongside and how they were curated by their owners – needs to be understood and documented (discussed in chapters 3 and 6).

Archivists interested in materiality are finding that conventional, context-orientated, archival description and digitisation methods do not readily accommodate their attempts to document material properties, nor the needs of an increasing number of researchers engaged with material culture theories or creative practitioners interested in the physical form, context and curation of archives. Seeking to understand what effective material-orientated access to pattern books might look like, the author studied librarians' and Humanities scholars' practices of describing physical characteristics of manuscripts and their use of technology to investigate them. Medieval manuscripts and early printed books

('incunabula') may appear to have little in common with nineteenth-century pattern books and textile samples, but they all represent communities of practice which no longer exist, as their modes of production have been superseded, making the records valuable sources of evidence for those communities' methods (Prescott, 2022). In addition, they are all visual, tactile objects, whose construction and appearance are important facets of their functions. Consequently, the author wanted to study how the Humanities community approaches its sources and evaluate which practices might be relevant for pattern books.

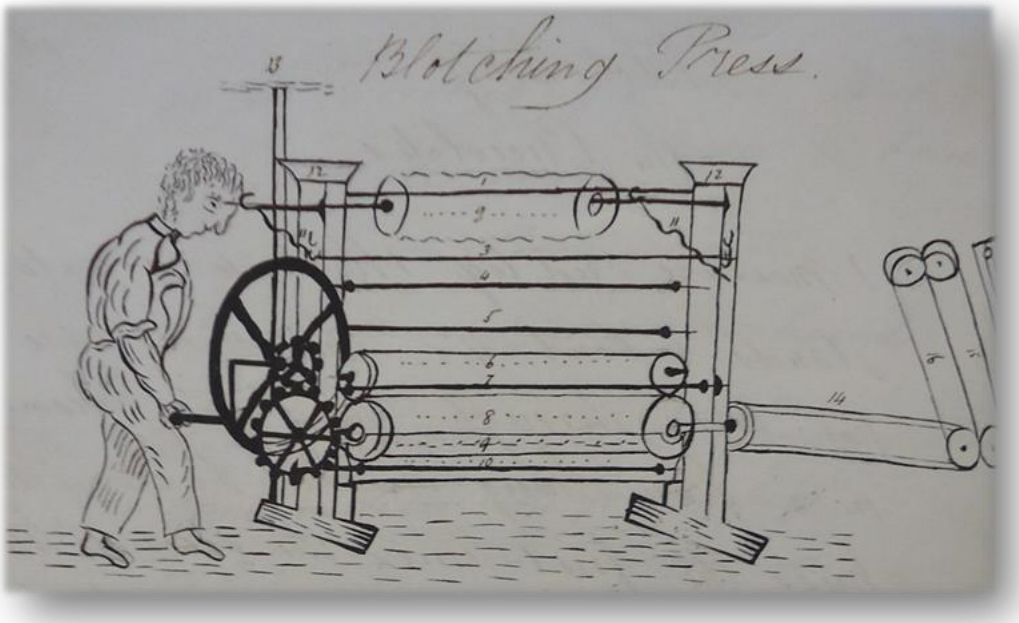
The project was conducted during the Covid-19 pandemic, which significantly impacted the GLAM (Galleries, Libraries, Archives and Museums) sector and concentrated organisations' attention on their digital practices and services. In March 2020, all galleries, libraries, archives and museums were forced to suspend public onsite access when the UK went into lockdown to limit the spread of the virus. Initial assumptions that life would quickly resume its previous rhythms were soon dispelled. Many archive repositories and research libraries did not reinstate public access until summer 2021, when legal restrictions covering travel, social contact and public gatherings were removed.[2] The pandemic exacted a terrible toll on lives, jobs and organisations. In the GLAM sector, it made plain the divide between the digitally well-equipped and those with minimal digital resources, but it also fostered innovation and positive change. Services' sudden, unforeseen closure forced staff to rely on digital tools to access collections, support researchers and engage with audiences. Those services with online catalogues, digitised resources and IT support were able to pivot quickly, albeit with considerable effort. Institutions with minimal digital resources and infrastructure were stranded. As the situation evolved, a number of organisations started offering virtual services and, post-pandemic, some of these have become part of their standard customer offer. This project engaged with the GLAM sector as staff re-introduced in-person services, evaluated what they had learned about their digital capabilities and activities, and assessed future priorities, and it reflects this period of evaluation, experimentation and rapid, unplanned change.

This thesis opens in chapter 1 with an introduction to pattern books and the historic manufacturing industry which they represent, concentrating on West of Scotland linen and cotton weaving, dyeing and printing. Chapter 2 explains the research methodologies and data collection methods employed to conduct the research. Chapter 3 showcases the

[2] Rules on travel and social contact were lifted in England on 19 July 2021 and in Scotland on 9 August 2021. Rules about testing and reporting infections remained in place until 30 April 2022 (Institute for Government, 2021; SPICe, 2022).

richness and significance of the material evidence found in archives and investigates how archivists engage with, and theorise about, materiality. Chapter 4 explores the ways in which GLAM institutions and Humanities researchers are using digital tools to foreground and interrogate archives' material features and make collections digitally accessible. The institutional case studies in chapter 5 examine cataloguing and digitisation initiatives and the operating context in which staff undertake them. Even if staff succeed in creating catalogues and digitising collections, publishing them online brings a new set of challenges and chapter 6 explores issues associated with publication, digital sustainability and invisibility, and asks how collaborative practices could help staff overcome the barriers. Chapter 7 analyses the project findings and presents a framework for creating effective digital access to pattern books and textile samples. The thesis concludes in chapter 8 with a review of the project, an outline of potential future research and next steps. Throughout the thesis, the discussion seeks to demonstrate the material and informational richness and significance of textile archives and propose approaches to ensure that these collections are better appreciated.

Making



Calico printing was a competitive business. Manufacturers, eager to reduce costs, welcomed efficiencies offered by new technologies. Workers were understandably less enthusiastic. In 1794, Milton printworks was the first textile manufactory in Scotland to install Cartwright's power looms. The blotching press was used to add coloured backgrounds to printed cloth. Milton's colourist measured every component of the large machine and described its action. The machine was five feet four inches high, while the large wheel which the operator turned was almost three feet in diameter. Its wooden rollers were offset, ensuring that the freshly printed cloth did not smear as it was lifted out the colour vat and sent on to the stove house to dry.

Figure 2. Drawing of blotching press, from dye recipe book, Milton printworks, 1831 (NLS MS.17979)

Chapter 1 Curating Scotland's textile heritage

For over two hundred years, Scottish textile manufacturing was an economic powerhouse, hub of technological innovation and a major source of employment. At the start of the nineteenth century, in the era before large-scale engineering and mining, it was Scotland's leading industry (Cooke, 2010, p. 2). Textile exports made up around 17% of total Scottish overseas exports (Durie, 1979, p. 161) and Scots developed new machinery, power systems and chemicals, especially for textile finishing (Cooke, 2010, p. 103). In 1851, 20% of Scotland's total workforce was employed in the textile industry. But the industry contracted severely from that peak. The huge sites and mass employment opportunities disappeared. Today's manufacturers are small-scale, although their skills and products are highly regarded. Deliberately low-profile businesses focus on high quality, niche markets, supplying designer brands such as Vivienne Westwood and Dolce & Gabbana (McMeekin, 2011). Industry data from February 2021 shows that around 9,000 people were employed by about 550 firms at that date; these firms contributed c.£305m in gross value added to the Scottish economy and their exports were valued at £360m (Dorsey, 2023). As the historic infrastructure disappears, public awareness about the industry's past importance and achievements is also declining (Nenadic and Tuckett, 2013, p. xi). Consequently, company archives form a vital body of data and evidence about manufacturing sites, processes and textile products, but their form and the specialist nature of their contents make them challenging for archivists to manage, interpret, catalogue and digitise. This chapter examines the scope of historic textile manufacturing in the West of Scotland[3] in the eighteenth and nineteenth centuries to understand what the archives represent and their historical value. It evaluates how business records have been perceived by academic historians and archivists and outlines the practical challenges archivists face administering textile company archives. It concludes by surveying the literature to show how pattern books are informing historical research, being analysed to recover past technical knowledge and skills, and re-purposed for creative projects and new commercial product development.

Overview of Scottish textile production

Aspects of Scotland's textile industry are familiar to interested publics, for example, New Lanark mills, Paisley thread, Harris Tweed and Dundee jute. These represent just a few

[3] Following Slaven and Nisbet, the West of Scotland is defined as the historic counties of Ayrshire, Dunbartonshire, Lanarkshire and Renfrewshire.

elements of a complex, diverse and extensive industry which has encompassed the spinning and weaving of linen, silk, cotton, woollen and synthetic textiles, as well as the production of knitted wares, lace, thread, carpets and linoleum. Bleaching, dyeing, printing and embroidering have been integral to production, enhancing the integrity of the raw textiles and improving their saleability. Manufacturing has also fostered the production of dyes, chemicals, soap and machinery. A comprehensive history of textile manufacturing in Scotland is beyond the scope of this thesis, as is any attempt to put the industry in its wider historical context and address issues such as the involvement of enslaved people in the supply of raw cotton or enterprises funded through the profits of sugar plantations.[4] Rather, this overview provides a brief account of key developments in the branches of manufacturing featured in this project, to provide context for the discussion and to demonstrate why Scotland's documentary textile heritage merits preservation and the investment of resources to make it accessible for research, community memory and creative re-use.[5] It commences with the growth of fine linen manufacturing in the West of Scotland during the eighteenth century, an industry which, by honing workers' skills and establishing effective business structures, created strong, adaptable foundations for the textile manufacturing which superseded it. The overview moves on to look at the brief rise and fall of silk gauze weaving, then at cotton spinning and weaving, before concluding with textile finishing.

Linen manufacturing

According to Alastair Durie, the eighteenth-century linen industry was second only to agriculture in its contribution to the Scottish economy and as an employer (1979, p. 158). In 1700, linen formed two-thirds of Scotland's exports (Cooke, 2010, p. 12), despite linen manufacturing being 'small-scale, inefficiently organised and burdened by the long acceptance of modest skills and poor-quality products' (Slaven, 1975, p. 79). Most people in Scotland could only afford the cheapest, coarsest cloth, while wealthier citizens bought linens from the Continent and London, so there was little incentive for Scottish linen weavers to invest in improving their products (Durie, 1979, p. 1). But in the first half of the eighteenth century, every stage in the manufacturing process - preparing the flax,

[4] For comprehensive histories see Clow, A. and Clow, N.L. (1952) *The chemical revolution: a contribution to social technology*. London: Batchworth Press; Cooke, A. (2010) *The rise and fall of the Scottish cotton industry, 1778-1914: the secret spring*. Manchester: Manchester University Press; and Durie, A.J. (1979) *The Scottish linen industry in the eighteenth century*. Edinburgh: Donald.

[5] Textile manufacturing artefacts and built heritage are equally important, but are not the focus of this research project.

spinning, weaving, bleaching and quality control - was significantly improved, partly through local initiative and partly by government investment (Durie, 1979; Nisbet, 2009). Although linen was manufactured across the country, the majority of production was concentrated in the counties of Angus, Fife, Perthshire, Lanarkshire and Renfrewshire. Manufacturers[6] in the East and North East of Scotland mainly produced large volumes of coarse cloths; nevertheless, some fine linens were manufactured, in particular, damask in Dunfermline, a speciality established by the 1720s (Durie, 1979, pp. 11, 24). In the West, manufacturers decided to specialise in fine linen fabrics, although their output also included some coarse cloth. They promoted improvements in weaving skills and organised production and distribution more efficiently and by 1715, local weavers were producing fine linen cloths such as lawns. By the 1730s, fine linen weaving was spreading across the region (Durie, 1976; Nisbet, 2009). The linen industry across Scotland benefitted from the British government's decision in 1727 to set up the Board of Trustees for the Improvement of Manufactures and Fisheries in Scotland [henceforth, the Board of Trustees] to address Scotland's industrial weakness. The Board of Trustees commissioned research into linen spinning and weaving, awarded development grants to manufacturers and quality-controlled output to raise standards; from 1728, only linen cloth stamped by its inspectors could legally be sold (Slaven, 1975, p. 82). Board of Trustees statistics for the amount of linen stamped between 1728 and 1800 illustrate the growth in production and the value of linen as a commodity (Table 1, from Nisbet, 2008, appendix 4a).

Year	Yards stamped	Value
1728	2.2 million	£103,312
1750	7.6 million	£361,737
1780	13.4 million	£622,188
1800	24.2 million	£1,047,599

Table 1. Total Scottish stamped linen output, 1728-1800 (from Nisbet, 2008)

Similar data for the West of Scotland demonstrates the region's contribution to linen production for that period (Table 2). In 1727-1728, the amount of linen manufactured by Ayrshire, Dunbartonshire, Lanarkshire and Renfrewshire combined represented 20% of Scotland's total yardage of coarse and fine stamped linen cloth for that year; by 1777, this

[6] Manufacturers co-ordinated the production of cloth, rather than weaving it themselves. They procured yarn, oversaw weavers (most of whom worked in their own homes) and managed the sale of the finished cloth (Durie, 1979, p. 46).

figure had risen to almost a quarter of total annual yardage (Slaven, 1975, pp. 83–86; Nisbet, 2009).

Year	Yards stamped	Value
1727-1728	450,911	£21,264
1757-1758	3,190,172	£169,612
1777	3,298,976	£242,937

Table 2. Linen cloth output, West of Scotland (based on Slaven, 1975)

While linen manufacturing continued to expand in the East of Scotland in the first half of the nineteenth century, it fell away rapidly in the West of Scotland from the 1780s, as production switched to cotton spinning and weaving and, briefly but profitably, silk gauze weaving (Slaven, 1975, p. 86).

Silk gauze

Silk gauze weaving is a largely forgotten industry which thrived briefly in the West of Scotland between 1760 and c.1785. In 1760, Paisley weaver Humphrey Fulton proved that local weavers, skilled in weaving fine linen thread gauze, could master silk gauze weaving, and that production could be financially viable. Silk gauze weaving expanded rapidly, fostered by half a dozen London silk partnerships (Campbell, 2002) and taken up by weavers, Durie suggests, because King George II's death in 1760 had impacted sales of muslin. Durie highlights a note, appended to a Board of Trustees' stampmasters report of November 1761, which reported that public observation of mourning protocols for King George II had caused demand for fine, patterned linen muslin to plummet and thereby prompted nearly a third of Paisley-area manufacturers to switch to weaving silk gauzes (Durie, 1976, p. 185).[7] Management of the industry resided in Paisley and Glasgow, but weaving took place across the region, in Hamilton and Strathaven in Lanarkshire, for example, and Beith and the Irvine Valley in Ayrshire (Slaven, 1975, p. 86). Scottish silk gauze became highly fashionable, especially in Paris, attracting customers by its quality and diversity of designs, and more than half of output was exported to the Continent, the Americas and Russia. In 1772, silk gauze production in Paisley was valued at £60,000; by 1781, it had reached £336,000. In that year, Renfrewshire's total textile output (linen

[7] Durie does not expand on this point, but presumably weavers were attracted to silk gauze because most of it was exported, so demand was unaffected by the British population's observation of public mourning protocols concerning dress.

cloth, linen thread and silk gauze) was valued at £600,385, exceeding the output value of linen manufacture in the rest of Scotland (Campbell, 2002; Nisbet, 2008, appendix 4b, 2009). At its peak, the industry employed about ten thousand workers (Slaven, 1975, p. 86) and higher incomes for weavers and manufacturers transformed the health and prosperity of the community. However, from the end of the 1780s, production plummeted. French tariffs, wars between 1792-1815 and the appeal of cheaper, washable, cotton muslin all impacted sales but, ultimately, the fabric simply fell out of fashion (Campbell, 2002). In 1809, output was worth just £9,600 (Nisbet, 2008). Despite the industry's short duration, the skills Renfrewshire weavers gained enabled them to transition quickly to weaving cotton muslin and, later, wool and silk shawls (Lochrie, 1987).

Cotton spinning and weaving

Scotland was twenty years behind Lancashire in embracing cotton spinning and weaving – but this proved to be to the Scottish manufacturers' benefit. Lancashire pioneers had refined the technology and tested the market, allowing Scottish manufacturers to establish quickly in the 1780s. The first Scottish spinning mill opened in Penicuik, Midlothian, in 1778; by 1793, thirty-nine spinning mills were operating across Scotland (Slaven, 1975, p. 93). Despite local efforts, cotton manufacturing did not thrive in the East of Scotland and many firms returned to linen (Cooke, 2010, p. 4). Similarly, in the South West, initial successes faded away and cotton mills were converted to woollen cloth production (Donnachie, 1987, pp. 27–28). The West of Scotland emerged as the predominant Scottish cotton manufacturing region, with production centred on Glasgow and Paisley (Cooke, 2010, p. 5). The region's damp climate was well-suited for cotton manufacturing, while its port and river infrastructure and access to finance and cheap labour helped the industry to prosper (Cooke, 2010, p. 28). In the 1790s, around half of Scotland's machine spinning industry was based in or adjacent to Paisley (Nisbet, 2009); by 1833, around 85% of mills in operation (117 out of 134) were located in the Glasgow-Paisley area (Slaven, 1975, p. 96). Initially, West of Scotland cotton manufacturers chose not to compete with Lancashire's well-established market in cheap cottons. Instead, they capitalised on local weavers' expertise in weaving fine linen and silk and concentrated on producing high-quality cotton muslin. After 1800, production diversified into a broader range of fabrics, such as plain calicoes and fustians (Slaven, 1975, p. 101). Power weaving grew slowly. In 1831, there were still c.45,000 handloom workers in the region compared to approximately 15,000 power looms in operation. In the 1830s, expansion in spinning ceased, although investment in weaving continued to grow, led by specialist businesses like David & John

Anderson of Glasgow. The cotton industry in Scotland faced more uncertain operating conditions as manufacturers experienced increased competition from other countries, as well as financial issues, which impacted their ability to invest in new machinery, increased business instability and fractured industrial relations when they cut wages to reduce costs (Cooke, 2010). Robertson (1970) also cites a failure to respond to changes in customer preferences. The international financial crisis of 1857 and the impact of the American Civil War on supplies of raw cotton caused the industry to contract severely during the 1860s. Although cotton manufacturing stabilised until the 1890s, it subsequently declined sharply, until in 1914, just nine cotton spinning firms remained in Scotland. As cotton products were not subject to the same controls as linen, there are no comparable production statistics (Slaven, 1975, p. 108). Export data on manufactured goods was the most consistently collected data but, as it excludes goods made for the home market and is skewed by changes in the value of goods, it provides an incomplete picture. Cotton manufacturing was a major employer in the first half of the nineteenth century. In 1791, 181,000 women, men and children were engaged in spinning, weaving and tambouring, mainly in their own homes. In 1838, 36,000 people were employed in spinning and weaving factories and another 45-50,000 were employed as outworkers, mainly handloom weavers and embroiderers (Robertson, 1970; Cooke, 2010, p. 145). The 1851 census recorded 257,127 people (20% of Scotland's total workforce) employed in the textile industry, 60% of whom worked in the cotton industry. In comparison, in 1851, mining and quarrying combined employed 53,631 and shipbuilding 4,396 people (Cooke, 2010, p. 4).

Textile finishing

Woven cloth can be used without being bleached, dyed or printed, but these finishing processes enhance the fabric's integrity and improve its appearance and texture, making it more attractive to customers (Campbell, 2002; Nisbet, 2009). Until the 1730s, skilled linen finishing in Britain was largely confined to London (Durie, 1987). As a locally-based finishing industry was an essential component of a fully-functioning textile industry, the Board of Trustees and private and commercial capital facilitated the establishment in Scotland of new bleachfields operated by professional, skilled staff (Durie, 1979, p. 55). By the 1770s, Scotland was host to around ninety commercial bleachfields, as well as many smaller ones run by weavers, and almost all linen manufactured in the country was being bleached there (Clow and Clow, 1952, p. 180; Durie, 1979, p. 86). In 1815, the number of bleachfields had risen to over two hundred and fifty, concentrated around Glasgow, Paisley and Perth and employing about four thousand people, four-fifths of

whom were women (Clow and Clow, 1952, p. 197). Until chemical bleaching agents were developed, cloth was treated with natural agents and spread out in fields to be bleached by the sun: linen could take up to eighteen months to bleach white. The invention of bleaching agents revolutionised the process. Sulphuric acid, adopted in Scotland around 1756, reduced linen bleaching to four months (Cooke, 2010, p. 125). Chlorine gas was introduced in 1787, but was corrosive and awkward to handle, problems resolved by Charles Macintosh's and Charles Tennant's invention of bleaching powder (hypochlorite, $CaOCl_2$) in 1798. Bleaching powder was transformative. Cotton could now be bleached in days, all year round, as the whole process could be undertaken indoors. Linen still required to be spread outdoors, but only for a few weeks (Slaven, 1975, p. 82; Durie, 1979, p. 103). Macintosh and Tennant set up a factory at St Rollox, Glasgow, to manufacture the bleaching powder; in 1799-1800, they sold fifty-two tons of it, and by 1870, annual production exceeded 9,000 tons (Clow and Clow, 1952, p. 193). Durie declared that 'the development of the bleaching sector in Scotland is one of the great success stories of the eighteenth century economy' (1987, p. 2).

Bleaching was closely allied with dyeing and printing. The Harlem Dye Company, which opened in 1740, was the first dyeworks in Glasgow (Clow and Clow, 1952, p. 207). The specialist Turkey red dyeing process[8] was established in Glasgow by George Macintosh and David Dale in 1785 (Peel, 1952) and subsequently became a global business in the West of Scotland, especially in the Vale of Leven. Linen printing began in the 1720s on the Water of Leith (Clow and Clow, 1952, p. 224; Irwin, 1965a), giving Scottish printers a valuable twenty-year lead over their Lancastrian rivals. By the 1780s, twenty-seven printing firms were operating in the West of Scotland. A list of Scottish printworks dated 1840 names sixty-six firms operating seventy-five printworks (Manchester Archives M75/5/3/117), representing 42% of the printworks in Britain (Cooke, 2010, pp. 79, 128). Fourteen printworks were located in Dunbartonshire, twenty each in Lanarkshire and Renfrewshire, and nine in Ayrshire. The industry peaked at eighty-one printworks in 1851. From then it contracted and, by 1919, there were only ten printworks left in Scotland. Cooke believes that Scots were leaders in finishing, from the application of machinery and power systems to the use of chemicals (2010, pp. 93, 103).

[8] Turkey red dyeing, used to dye cotton bright red, included an oiling process which made the colour fade-resistant.

The statistics for textile production and product value demonstrate the industry's contribution to the Scottish economy and trade, particularly in the era before industries such as mining and shipbuilding dominated. Numbers, however, are only part of the story. Growing sophistication in all areas of linen manufacturing - spinning, weaving, finishing and business management - created a robust, skilled and adaptable sector, able to embrace new technology and textiles as required (Durie, 1979; Nisbet, 2009; Slaven, 1975). Cooke described cotton manufacturing as 'the major engine of economic growth in Scotland during the early industrialisation of the country' (2010, p. 5); he believed that its demands on machinery manufacturing, construction and transport aided the subsequent development of manufacturing in the west of Scotland. The industry was a leading employer, particularly of women and children, and it shaped communities. Jobseekers flooded into manufacturing centres, greatly expanding existing villages and leading to the creation of new ones. Residents were bound by a shared experience of working in textile manufacturing and living in a place dominated by the manufactories. Notwithstanding, the extreme contraction of the textile industry in the twentieth century, the removal of its infrastructure and ephemeral nature of its products have contributed to a loss of knowledge about the industry's significance. Its memory has been eclipsed by heavy industry, whose legacy has been championed and preserved by passionate, vocal enthusiasts (Flockhart, 2019). Some former textile manufacturing communities celebrate their heritage, but many struggle with the ongoing blight of unemployment and derelict buildings.[9] The industry's heritage, in the form of buildings, infrastructure, artefacts, textiles and archival records, is essential to understanding, interpreting and communicating its contribution, impact and legacy, but preserving that evidence has proved challenging.

The remains of the industry in the West of Scotland

Despite the scale and longevity of textile manufacturing in Scotland, limited evidence of it survives today. Many buildings and sites have been demolished or repurposed. Owners sold machinery for scrap and burned their records. Some machinery, equipment, textiles and company records have been preserved by heritage organisations but only represent a fraction of the industry. Ian Johnson (1993) argued that Scotland's industrial heritage

[9] The Scottish Index of Multiple Deprivation 2020 (www.simd.scot, accessed 18 Aug 2024) includes the council areas West Dunbartonshire, North Lanarkshire, East Ayrshire and Renfrewshire in its list of Scotland's ten most deprived areas. Within these areas, several former textile manufacturing communities are highlighted as pockets of particular deprivation e.g. Vale of Leven (West Dunbartonshire), Newmilns (East Ayrshire) and Paisley (Renfrewshire). Initiatives showcasing community textile heritage include heritage trails round Bridgeton, Glasgow and along the River Leven.

should be valued as much as its literary heritage and that a national strategy should be created to document and promote industrial archaeology, which was then disappearing at pace.[10] He viewed sites, artefacts and archives as a collective, collaborative legacy and pointed to the results of John Hume's surveys of Glasgow's industrial buildings as evidence. In 1974, Hume identified 1,100 important sites. In 1983, just three hundred of those sites remained. Johnson recognised the low public profile of the textile industry and noted how many historically important buildings had disappeared, something evident in the West of Scotland. In Paisley, Coats Viyella plc demolished the 'iconic' Atlantic and Pacific mills on the Anchor thread site in 1972-1973, because they were in poor condition and no longer suitable for production (Paisley People's Archive, 2013). The French Renaissance-style Number 1 Spinning Mill at Ferguslie followed in 1992, despite its Category A listing (Historic Environment Scotland, 2024b). In the Vale of Leven, Dunbartonshire, former bleaching and printing works at Dalquhurn, Dalmonach, Cordale, Dillichip and Alexandria have all gone. The Category A Listed cotton twist mill at Catrine, East Ayrshire, described on Historic Environment Scotland's Canmore record as 'architecturally the finest in Scotland', was demolished in 1963-1964 (Historic Environment Scotland, 2024a). Some sites have been sensitively repurposed. For example, the restoration of James Templeton & Son's Venetian Gothic-style carpet factory in Glasgow won the top award in the Regeneration of Scotland Design Awards 1986 (Historic Environment Scotland, 2024c). The former Anchor thread mills at Seedhill, Paisley, were refurbished and leisure, local government and charity tenants share the space with the Paisley Heritage Centre and Paisley Thread Mill Museum, preserving the building's history in situ and making it accessible to users and visitors. Other former sites have been turned into heritage attractions, including New Lanark Mills and weavers' cottages in Paisley and Kilbarchan (Renfrewshire).

Inevitably, few of the textiles which were manufactured survive. Worn-out clothes were repurposed and furnishing fabrics succumbed to wear or rotted in sunlight. Because of this, everyday clothing and furnishings are scarce in museum collections. High-end womenswear is the main survivor, reserved for special occasions and handed down as family heirlooms. Even here, the colours may have faded or the finish on the cloth deteriorated. Few fabrics can be provenanced to the firms which spun, wove, bleached, dyed or printed them. Therefore, textile pattern books form a valuable repository for

[10] Historic Scotland published the draft of *An Industrial Heritage Strategy for Scotland* in 2015, but this does not appear to have been taken forward.

historic textiles, encapsulating a broad range of textile types, designs, colours and finishes. Unworn, not washed, protected from the light and subject to minimal handling, pattern book samples may preserve the appearance of the cloth as new (Alcántara-García and Nix, 2018). The textiles are also often (though not always) provenanced. Pattern books and other company records provide information on products, processes, business management and operations, and the use of technology; surviving inventories show site layouts and list what equipment was held in each building.[11]

However, these textile archives have fared no better than the sites and textiles in terms of their preservation. While the survival of records for Scotland's linen industry is good, few records remain from Renfrewshire's silk gauze industry (Nisbet, 2009). Cooke argues that the importance of Glasgow and Paisley's cotton industry is not appreciated because far fewer records from companies which operated in those places have been preserved in comparison to records from factory villages like Catrine and New Lanark (2010, pp. 2–3). The absence of cotton and silk industry archives is illustrated by comparing the number of businesses extant in 1820 with archive holdings known in 1990. The *Commercial Directory* (1820) listed sixty-one cotton spinners and yarn merchants, 301 manufacturers/dealers in cotton goods and eighteen silk mercers with an office or factory in Glasgow. But the Historical Manuscripts Commission's guide to holdings of textile company archives in Britain and Northern Ireland (Royal Commission on Historical Manuscripts, 1990) only lists archives for twelve cotton manufacturers and two silk mercers in the West of Scotland. Until three pattern books from Leven printfield, Dunbartonshire, dated 1794-1802, came to light in the early 1960s, there was no visual record of eighteenth-century Scottish linen and calico textile printing at all (Irwin, 1965a). When managers at Dalmonach printworks and Messrs Z. Heys & Sons in Barrhead were asked about historic company archives in 1923, neither firm could locate any early records (Manchester Archives M75/8/3/1). Although this project examines textile manufacturing in four counties in the West of Scotland, little has been said about Ayrshire. Ayrshire was home to spinning, weaving, whitework embroidering, calico printing, bonnet-making, and machine lace, knitwear and carpet manufacturing, but there is a dearth of company archives available. Textile manufacturers' secretiveness is one factor in the absence of records, because companies destroyed production records they no longer required to ensure they did not fall into rival hands (Ashton, 1958), or simply avoided committing sensitive

[11] For example, a detailed inventory for Thornliebank printworks, 1904, contains a site plan and lists all the contents of each building. The total value of the site and contents was £380,405, equivalent to nearly £30m today (Manchester Archives M75/4/1/11).

data to paper at all. Robert Peel, a United Turkey Red Company dyer, admitted that the firm's Turkey red dyeing and printing practices had been 'so carefully guarded […] that few inside the works themselves knew anything more than the broad outline', and senior company technicians were banned from publishing on the subject (1952, p. 502). Two other factors affecting poor survival of archival material are past industry practices regarding record retention and cultural heritage sector custodians' views on the archival value of business records (Sykas, 2005, p. 14).

Managing the archival legacy

When a textile manufacturing company was taken over by another firm, its corporate records were often destroyed, while the design and production records were viewed as assets and preserved by the buyers for their re-use. However, during the mass closures of the 1930s to 1960s, surviving manufacturers were not interested in acquiring redundant design archives. Consequently, some owners destroyed all their records, although others offered their more visually-appealing pattern books to local museums and archives (Sykas, 2001). In Scotland at this period, the preservation of records was hampered by a lack of appreciation for the value of business history and business records and an absence of cultural heritage institutions with the capacity to accept often bulky archives. It was only in the 1950s that business history began to be accepted as an independent academic discipline in Britain. The University of Glasgow's decision to establish a Chair in Economic History in 1957 and the Colquhoun Lectureship in Business History in 1959 (a post partly funded initially by local businesses), coupled with the creation of The Business Archives Council of Scotland (BACS) in 1960, led to a significant change in ethos towards business records as archives in the West of Scotland, and elsewhere. The Colquhoun lecturer's responsibilities extended beyond research to surveying and collecting local business archives, with the support of BACS. As the Economic History department was soon overflowing with archives, in 1967, the University opened a purpose-built records store. The success of this work prompted the National Register of Archives (Scotland) to appoint regional surveyors to extend it, starting with the appointment of Michael Moss in 1970 for Western Scotland, followed by appointments for Eastern Scotland and the North-East (Slaven, 2023). Moss discovered, and subsequently rescued, with the assistance of Colquhoun lecturer Peter Payne, his assistant Tony Slaven and John Hume of Historic Scotland, 'tons and tons of records' from failing West of Scotland businesses (Moss, 1990, p. 123), with a degree of archival derring-do which would be frowned upon, or simply forbidden, today. Meanwhile, Joan Auld, the regional surveyor for Eastern Scotland,

secured records of collapsing businesses in and around Dundee, including from textile manufacturers (Moss, 1990).

Moss, Auld and their colleagues exhibited a new ethos towards business records, which took time to filter through to other archivists and researchers. A lack of understanding among archivists at this time about the research potential of business records discouraged them from welcoming these accessions into their institution (Moss, 1990). Pattern books had the added disadvantage of not fitting into existing archival categories (Sykas, 2005, pp. 14–15). Archivists' ambivalence was shared by other cultural heritage professionals. Referring to the National Museum of Scotland's acquisition of the United Turkey Red Company pattern books in 1961, Naomi Tarrant observed that it was '[not] a time when museums and industrial archaeologists were active in encouraging the preservation of [business records]' (1978, p. 62). Sykas adds, 'the importance of business archives was not to be widely recognised in the museum field until the end of the 1970s' (2001, p. 157). Even where heritage professionals have been enthusiastic about business records, suitable archival homes for these potentially large collections, mainly taken in by university and local authority archives, have been, and still are, sparse in Scotland, and public money to support their care scarce (Royal Commission on Historical Manuscripts, 1999). Moss (1990) reflected that, in the late 1970s, neither the local authority archive services, nor the university archives at Aberdeen, St Andrews, Dundee or Glasgow, had sufficient resources to pro-actively acquire business records. Local authority archive services in Scotland are relatively recent and generally small-scale. In 1964, Glasgow City Council became the first local authority in Scotland to appoint a full-time archivist (Anderson, 1997); its first appointee, Richard Dell, immediately became secretary of BACS, and he and his colleagues took in many of the industrial records rescued by Moss (Slaven, 2023). Other councils established archive services in the 1970s and 1980s (Anderson, 1997), but a survey in 1992 revealed that only Strathclyde Regional Archives (now Glasgow City Archives) offered a comprehensive service, while Lothian and Fife regions had no provision at all, and it concluded that all the regional services were much smaller in scale than the equivalent English county record offices (Campbell, 1997).[12] A survey by the HMC in 1998 showed that the capacity of university archive services had not grown significantly either by the 1990s and Scottish university respondents highlighted the 'general paucity' of funding for all professional activities, including storage and

[12] The survey was commissioned by the Royal Commission on Historical Manuscripts and the National Council on Archives.

cataloguing. The HMC observed that, overall, Scottish archives had ‘huge funding needs’ and that the ‘very small scale’ services did not have capacity to accept large business collections (Royal Commission on Historical Manuscripts, 1999, pp. 45–46).

Moss and his colleagues were determined that technical records would no longer be hived off to museums or specialist archives and would remain with the corporate records (Moss, 1990). But institutional collection policies, storage issues and modes of acquisition have resulted in some textile heritage collections being divided between heritage institutions. When the United Turkey Red Company folded in 1961, National Museums Scotland accepted two hundred pattern books as design artefacts (Tarrant, 1978, p. 63). Some sample books went to Glasgow City Council’s museum service, while the University of Glasgow Archives acquired other design records and the corporate records (University of Glasgow, 2000). After Stoddard International plc went into receivership in 2005, its archive was acquired jointly by the University of Glasgow, the Glasgow School of Art and Culture and Sport Glasgow (now Glasgow Life). Sykas’ survey of North-West of England textile archives identified ten company archives whose records had ended up in two or more heritage institutions (Sykas, 2001). It is important to acknowledge that dividing a collection between institutions to save all the records that merit preservation is preferable to destroying them. Nevertheless, a textile company’s design and corporate records contextualise and inform each other, so dispersal hampers users’ ability to make connections and interpret the nuances of the company’s operations. This is particularly true where a lack of signposting means that researchers are unaware that further records survive beyond the ones they have accessed. This research project explores ways in which technology and professional collaborations can enhance access to dispersed records.

Having accepted textile company archives into the repository, archivists need to ensure that the records and textiles are stored appropriately, catalogued in sufficient detail to be managed and accessible and, ideally, published online in some way to facilitate discovery and use. These tasks are not straightforward and are constrained by many services’ operating conditions. Textile company collections can comprise several record formats, each with specific requirements for storage. A0 size, unrolled design drawings are awkward to handle and store. Large, fragile volumes are best stored flat but placing them thus takes up precious shelf space in the strongrooms. Textiles may fade in daylight or certain types of artificial lighting and need to be shielded. Records do not always arrive at the repository in good condition. Tarrant observed that the United Turkey Red Company records ‘had been stored in less than ideal conditions’ by the company, presumably a

professional euphemism for wholly unsuitable. She described the volumes as 'very large and dirty', while the paper pages to which the textile samples had been affixed were disintegrating (1978, pp. 62–63). Tuckett and Nenadic (2012, p. 164) subsequently noted that the weight of the fabric samples in these volumes had weakened the bindings. After surveying the storage of pattern books within North-West of England heritage institutions in 1998, Sykas (2001) concluded that few were stored well. The institutions lacked sufficient storage and staff, and ever-reducing budgets worsened the situation. He did acknowledge that all the collections he surveyed were publicly accessible, even if some researchers were obliged to perch in the store to read them. Shortages of suitable storage and staff time are not exclusive to the North-West of England. Ten years of fiscal austerity, following the banking crisis in 2008, severely reduced budgets and staffing levels for many cultural heritage institutions, at least in the public sector. Hopes in 2018 that this position might improve were stymied first by the impact of the Covid-19 pandemic, then the cost of living crisis. The Local Government Information Unit's 2024 survey of the state of English and Scottish Councils' finance ascertained that, in England, over half of respondents believe they will be unable to balance their books in the next five years; one-third are cutting spending on arts and culture (Stride and Woods, 2024). In Scotland, 60% of Councils reported that they are cutting spending on arts and culture (Stride, 2023). Funding bodies such as Arts Council England, Museums Galleries Scotland, Creative Scotland and the Scottish Funding Council have all reduced or completely withdrawn grants (Adams, 2024a). The financial position of many cultural heritage organisations is precarious, limiting their scope to manage collections effectively.[13]

Even when archive repositories have sufficient suitable strongroom space to house textile collections in accordance with their needs, it takes time for staff to appraise and catalogue the records to provide intellectual access for staff and users. Sykas (2001) observed that, while services are urged to rescue local heritage, funding is rarely made available to employ staff to catalogue the rescued records. The National Lottery Heritage Fund (formerly the Heritage Lottery Fund) has awarded millions of pounds for archive sector projects since it was established in 1994, but its funding criteria prioritise public engagement (Maeer, 2017), which cataloguing projects struggle to fulfil. Currently, there are only two UK funding streams dedicated to archive cataloguing work. The *Archives*

[13] For example, Glasgow Life, which manages Glasgow City Council's cultural and leisure services, suffered losses of £38m due to the pandemic. In 2023, it announced it intended to make thirty-seven collections staff within the Mitchell Library, Glasgow City Archives and its museums redundant (Body, 2023).

Revealed programme awards approximately thirty grants annually; each grant has a maximum value of £50,000 (The National Archives UK, 2024).[14] The Business Archive Council offers one grant annually for cataloguing business records; the grant for 2024 is £5,000 (Business Archives Council, 2024). Most cataloguing must be undertaken by core staff when they can find time, or by volunteers. Collections may wait years to be catalogued. The United Turkey Red pattern books donated to National Museums Scotland were initially assessed by consultant Margaret Swain, who created a preliminary, partial catalogue, then virtually no other cataloguing work was attempted on the collection for sixty years. Eventually, Tuckett and Nenadic led a three-year project from 2011-2013 to complete Swain's basic list (Tuckett and Nenadic, 2012). Cataloguing textile company collections requires not only time but also sufficient knowledge about the industry to identify record types, their function and the data they contain. While archivists can confidently process standard corporate records like minutes and accounts, few are likely to have the specialist knowledge to interpret production records. Slaven (1990) acknowledged the crucial role of the Ballast Trust in cataloguing plans, drawings and photographs from Scotland's heavy industries, especially shipbuilding and engineering. This charitable trust was established in 1987 specifically to catalogue technical records, and volunteers with industry-specific knowledge are central to its success. As there is no equivalent to the Ballast Trust to support the cataloguing of textile company pattern books, archivists would benefit from guidance to undertake this task.

Pattern books

Textile companies managed their affairs through the standard managerial, financial and legal instruments common to UK businesses in the eighteenth to twentieth centuries, such as board minutes, profit and loss accounts, personnel records and inventories, and the form and function of these records will be familiar to archivists. The companies also developed sector-specific record types to manage their operations, including those categorised as 'pattern books'. Pattern books are volumes (folding cards also exist but are less common) which contain varying amounts of textual information and small pieces of fabric, known as samples or swatches, usually attached to the pages with wax, glue, tape or pins.[15] This record type was employed in several stages of the manufacturing process: in design planning and production; managing patterns ready for production; managing orders and

[14] The programme is funded jointly by The National Archives, The National Heritage Lottery Fund, Pilgrim Trust and the Wolfson Foundation. 20% of each grant has to be spent on public engagement activities.

[15] Some volumes contain samples of yarn rather than cloth.

stock ready for dispatch; and marketing (Sykas, 2005, p. 12). Terms used in the industry for these record types include 'show book', 'sample book', 'swatch book, 'dye recipe book', 'colourists' notebook' and 'dispatch book'. For the non-specialist, it can be difficult to categorise pattern books, especially if they have been repurposed at some stage in their career, so a brief overview is provided here of record types discussed in this project.

Figure 3. Show book, J.H. Young & Co., c.1908 (ASC UGD093/1/4)

Show books were used to market a company's product range to prospective customers. In 1764, William Stirling and Company advised customers that they 'could select their own patterns from pattern-books kept by the firm's agents in Edinburgh, Greenock, Ayr, Paisley, etc.' (Clow and Clow, 1952, p. 225). Show books can be identified by their smart appearance and minimal text, which may consist simply of a reference number beside each sample (Sykas, 2005, p. 12). Samples in J.H. Young & Co.'s show book of dress muslins are neatly arranged in two columns per page (Figure 3). Some samples are folded double to intensify the colour, while others are backed with coloured tissue paper. Each sample's reference code is written on a small label with decorative gold borders. Pattern books used by designers may also have minimal or no text. Company designers collated designs from multiple sources for reference, inspiration and to monitor competitors' output. Among records from Crum & Co., calico printers of Thornliebank, Glasgow, is a volume described as a sample book (Figure 4). Dated 1814, it contains hundreds of samples of printed cotton

dress fabrics. Unlike Young's carefully arranged show book, these are crammed onto the pages with little discernible order and no text to identify their source. The one exception is three pages attributed to Balls Bridge printworks near Dublin and dated 8 December 1814.

Figure 4. Designer's reference book, Alex. & James Crum & Co., 1814 (Manchester City Council)

Manufacturers wove and printed cloth to order, rather than speculatively. They used pattern books to record the patterns which they had ready to put into production when required. 'Pattern' in this context refers to production processes, rather than the visual design on the fabric. The samples encapsulated data about the loom set-up, the warp and weft, or dyeing and finishing techniques and the accompanying text specified information such as measurements for piece lengths, widths and pattern repeats, available colourways and reference codes for loom plans or printing blocks. 'Out' or 'Off' stickers marked patterns which had been withdrawn from production.[16] The pattern book page in Figure 5 contrasts with the smart show book (Figure 3). Here, the fabric is held in place with brown tape and the design has been altered with blue ink crosses. Notes on the page may record details about the fabric widths, pattern repeat and the reference number for the jacquard cards used to set up the loom. Textile printers used pattern books to manage the company's stock of several hundred printing blocks, plates and cylinders, with samples showing each design (Sykas, 1999, p. 58). Customer orders were recorded using fabric samples, as it was far easier to document visually the exact hue and design required than

[16] Examples of these are found in United Turkey Red Company sample books e.g. ASC UGD013/8/5.

describe it in words. Evidence of this practice can be found in John Orr Ewing & Co.'s shipping and order books, 1868-1889 (Tarrant, 1978) and Exeter merchant Claude Passavant's 1760s dispatch book (Nix, 2021a).

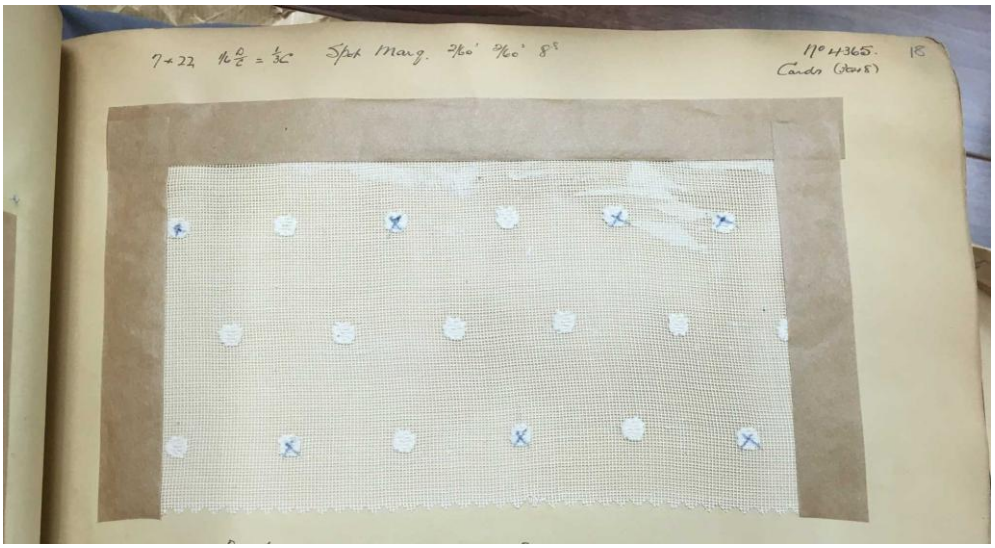


Figure 5. Pattern book for managing patterns in production, with alterations to a design, David Ligat & Sons Ltd. (ASC UGD093/1/1)

Dye recipe books document the ingredients and processes for dyeing yarn or cloth. As with weavers' records, fabric samples act as reference points. Dyers colour-matched customer orders or inserted samples of fabrics they had produced, in case there was a repeat order. Dyers also used dye books to record their experimentation with dyes and processes (Quye, Cardon and Balfour Paul, 2020, p. 160). Glasgow calico printer Patrick Mitchell decided to expand his skills and secured a position at a silk yarn dyeworks in Spitalfields in 1809. In his notebook, he recorded the preparatory washing process, boiling bagged skeins of silk in soapy water for three hours, and the steps he followed to dye silk yarn safflower pink, pea green and sky blue. Beside each recipe is a sample of his dyed yarn, documenting the outcome (Figure 6).

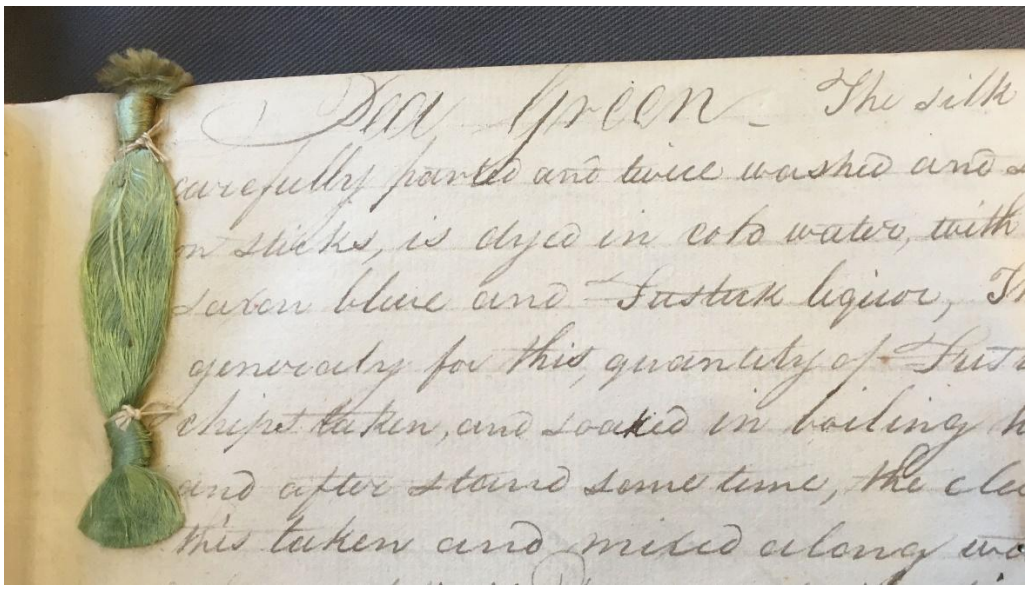


Figure 6. Silk yarn dyed pea green, Patrick Mitchell, 1809 (NLS MS.17968)

Like dyers, textile printers used pattern books to document their dyeing and printing work. These records are very similar to dyers' recipe books and are frequently catalogued as dye recipe books; 'colourist's notebook' is also used. They list the quantities of dyes and chemicals required for each pattern and describe the steps of the process. A fabric sample documents the pattern visually. Some take the form of day books, documenting daily printing work as it was carried out; others take the form of reference tools, to be taken off the shelf like cookery books when a recipe is required. A colourist's notebook from Cordale calico printworks, near Dumbarton, dated 1815, records recipes to produce delicate floral motifs and bright geometric designs and provides examples of the use of cow dung to fix colours and cleanse the cloth (Figure 7). It was neatly written up by employee James Pickup, with occasional annotations to clarify procedures. Dye-stained fingerprints imply that it was referred to during production. As can be seen, pattern books were used to deliver a range of functions by manufacturers in conjunction with their other operational and managerial records. They form a rich source of data about production methods, business operation, design and marketing, and communicate something of the skill and knowledge of the people who produced and used these records and could 'read' the fabrics; consequently, they are valued by researchers as sources for investigating diverse research questions, as well as prompting fresh creative inspiration.

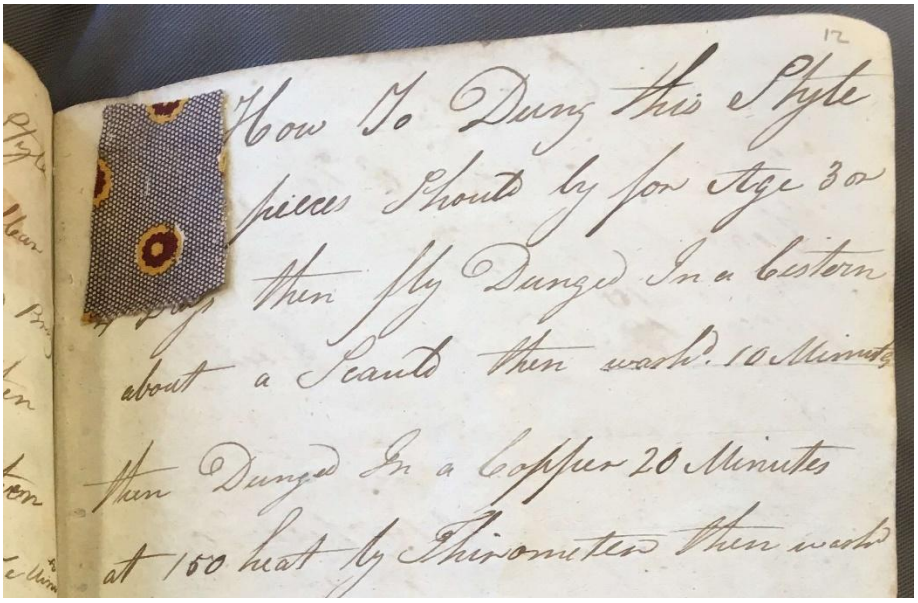


Figure 7. Dye recipe book, Cordale printworks, 1815 (NLS MS.17975)

Textile heritage research

Researchers have used textile company archives, including pattern books, to deepen modern understanding about, *inter alia*, the economics, ethics and social impact of textile manufacturing, business operations, manufacturing processes, raw materials, the application of new technologies and the craft skill of the workforce. Historic pattern books and textiles serve as design libraries for commercial designers seeking inspiration for new products and as springboards for new artistic creations. This literature review focuses on how pattern books have fostered new insights into aspects of West of Scotland textile manufacturing. It examines how scientific analyses of pattern book textiles are providing insights into yarns, colourants and manufacturing processes. Finally, it looks at instances of pattern books being used to inspire new creative outputs. It does not attempt to undertake an exhaustive survey of the field. Rather, its purpose is to demonstrate the range of research questions being applied to pattern books and textiles, with a view to understanding the implications for managing them and making them accessible. It also reflects the patchy preservation of pattern books and other company records, discussed above, as well as researchers' interest in engaging with them as sources.

Research into the West of Scotland's eighteenth-century fine linen industry and early cotton manufacturing tends to concentrate on business operations, economics and international contexts, reflecting researchers' interests and the absence of manufacturing

records, especially pattern books, for other types of research to draw on. For example, Tom Devine (1976, 1978) has researched Glasgow merchants' financing of cotton manufacturing through profits made from sugar plantations and tobacco. Durie (1976) carried out a detailed economic analysis of fine linen production, making extensive use of Board of Trustees' minutes and linen stamping data. Nisbet (2008, 2009) drew on various archival sources, including company records (but not pattern books), to analyse business organisation, financing and the operation of linen and early cotton manufacturing in Renfrewshire to explain how the county became the site of approximately half of Scotland's cotton spinning and weaving production by the 1790s. Nisbet's research supports Johnson's argument (1993) that built and documentary heritage are complementary. Nisbet (2008) visited all of Renfrewshire's former mill sites and studied archives relating to the sites and businesses. Combining all the evidence, he came to an understanding of the water management methods Renfrewshire manufacturers used to compensate for the lack of flow in local rivers and which allowed them to operate their mills year round. While linen pattern books are few, silk manufacturers' do survive and are, Campbell (2002) points out, a vital resource for studying this fragile textile, as few gauze garments remain. Campbell mentions Paisley Museum's collection of pattern books and illustrates her article with photographs of silk gauze samples from Paisley manufacturer Brown Sharp's pattern book. However, Campbell's article makes no further reference to these records, and it is not clear to what extent they shaped her findings.

Nineteenth-century Paisley was synonymous with shawl manufacturing, which was taken up by local weavers around 1805 and flourished between 1830 and 1870 (Lochrie, 1987). Much has been written about the operation of the industry and the shawls, of which Paisley Museum has an extensive collection. But much less has been written about Paisley Museum's large collection of shawl manufacturers' pattern books.[17] Dorothy Whyte was curator at Paisley Museum during the 1940s and her article (1970) on the production of imitation Kashmiri shawls in France, Norwich and Paisley helpfully places Paisley's industry in its wider context, but makes no explicit reference to the Museum's collection of shawls or pattern books, although, as curator, Whyte presumably drew on them. But Jim Hunter (1976) demonstrates how local pattern books provide valuable evidence about the rich diversity of fabrics woven in Paisley between 1800 and 1820, a period which he

[17] Paisley Museum holds over 1,000 shawls, manufactured in Paisley and elsewhere (Museums Galleries Scotland, 2024). Lochrie (1987) mentions that the museum holds a large number of shawl pattern books, but beyond a few entries in the HMC's guide to textile archives (Royal Commission on Historical Manuscripts, 1990), there is no published guide to their holdings so it is not clear exactly how many they have.

believes laid the foundations for Paisley's subsequent success in shawl-weaving but which has been overlooked by researchers. He examines four early nineteenth-century pattern books in Paisley Museum, containing samples of muslin, gauze and other fabrics produced by local weavers. One volume, belonging to John Hair of Causeyside and dating c.1817, includes a piece of lightweight linen woven in the 1750s-1760s, rare physical evidence, Hunter points out, of Renfrewshire weavers' switch to weaving lighter fabrics in that period, described by contemporary local historians. When Hunter compared Hair's pattern book with one (c.1810-1812) belonging to Paisley manufacturer James Whyte, also of Causeyside, he discovered that both contained shawl samples featuring locally designed floral patterns, a style which disappeared in the 1830s and whose memory has been eclipsed by a lack of surviving shawls and the subsequent proliferation of Indian-imitation styles. He also noted that the Indian-style samples lacked the sophistication displayed by Edinburgh-made shawls of the same period, confirming Whyte and Swain's findings (Whyte and Swain, 1962) that Edinburgh shawl weavers were ahead of Paisley's at this date. From his analysis of all four pattern books, Hunter concludes that, between 1800 and 1830, Paisley manufacturers did not specialise in shawls or any other product and instead were skilled in weaving a range of fabrics. He reflects that their decision to abandon this approach in the 1830s and specialise in shawls fatally weakened the town's resilience to changes in consumer trends, leaving weavers with no substitutes in the 1850s when demand for shawls plummeted.

Like Hunter, Maureen Lochrie was interested in shawl designing. She combined information in Paisley shawl manufacturers' pattern books with evidence from Paisley School of Design board minutes to evaluate whether the School was effective in training new designers for the local textile industry (Lochrie, 1987). In the 1830s, the government became concerned that British manufacturers were deficient in design and decided to establish schools of design in manufacturing areas to provide design training and raise standards. However, the schools' curriculum focused on general art tuition, like drawing, rather than industrial design skills, resulting, Lochrie reports, in a conflict of purpose and failure to teach the skills industry required. Whyte declared Paisley School of Design, which opened in 1848,[18] 'a dismal failure'(1970, p. 36), but Lochrie (1987) produces a more nuanced analysis of the school's impact. By analysing students' occupations recorded in the school's minutes in the 1850s, she proved that, despite employers' reservations about the curriculum, the school did attract textile workers, as approximately one-third of

[18] The other school in Scotland was set up in Glasgow in 1845; it became Glasgow School of Art.

pupils were pattern drawers employed by local textile manufacturers. Further, when Lochrie compared lists of prize-winning students with the names of designers identified in leading Paisley shawl manufacturers' pattern books, she ascertained that some prize winners had had designs taken up by their employers, demonstrating that their work was of a commercial standard and suggesting that they had derived at least some benefit from their tuition at the school. Lochrie also uses the minutes to demonstrate that the school's success was hindered by the involvement of local textile company owners in its management. She claims that, because of their 'commercial jealousy' (1987, p. 110), the managers prevented the school from teaching pattern designing, fearful that students would inadvertently reveal employers' secrets in class. Despite its flaws, she concludes that the school had value, even if it did fail to fulfil its potential.

Designs on shawls could be printed rather than woven. Francina Irwin used pattern books to investigate the design and appearance of printed cotton shawls produced in the West of Scotland between 1794 and 1815. Irwin (1965b, 1966) reviewed a pattern book of painted shawl designs dated 1794-1795, which belonged to Todd, Shortridge & Co., of Leven printfield. Like Hunter, she found designs emulating Indian woven shawls and others with more natural flower forms forming sprays and trailing borders. Irwin compared the Leven designs with painted designs for shawl borders and handkerchiefs in a pattern book from McDowall & Company, Milton printworks, which she dated 1808-1815. She found that the prevalence of 'pine cone' designs in the Milton volume reflected the growth in production of woven imitation Indian shawls in Edinburgh and Paisley at that date. Irwin (1981) drew on references to shawls in calico printer Patrick Mitchell's day books and business correspondence for further evidence of designs and seasonal colour trends. She used patterns to refute suggestions that printed shawls competed with woven shawls, arguing that the two types co-existed, meeting different customer requirements. She points to shawl designs registered with the Board of Trade to demonstrate that shawl manufacturers like J. & J. Robertson of Paisley used the same design on both printed and woven shawls. However, Irwin also observes that evidence in local pattern books and Board of Trade Design registers proves that shawl printing did not take hold in Paisley until the mid-late 1840s, making the town a late adopter, rather than a leader.

The Turkey red process of dyeing cotton a bright, colourfast red flourished in the West of Scotland in the nineteenth century (see Figure 8 for a sample of cloth dyed using this process). A substantial body of records survives from firms involved, including over two hundred pattern books belonging to the United Turkey Red Co. (UTR) in the Vale of

Leven. Peel (1952), a dyer for UTR, was the first to write a historical overview of the origins and development of Turkey red dyeing in Glasgow and the Vale. His account prioritises the technical processes, unsurprisingly, given his occupation, but also provides a detailed chronological analysis of the growth and decline of the industry. Peel draws on the *First Statistical Account*, contemporary newspapers, local history publications and journals for data, but not, it appears, his employer's records. This is an unfailingly positive account of the industry and has been referenced extensively by almost every other researcher covering Turkey red dyeing in Scotland.

Figure 8. Example of Turkey red discharge printing, 1857 (ASC UGD013/8/3)

UTR's pattern books were acquired by National Museums Scotland (NMS) in the 1960s and NMS curator Naomi Tarrant (1978) described the circumstances of their acquisition, the challenge their poor condition presented to NMS staff, and the functions the records served. She returned to the archives to help analyse issues associated with the introduction and development of Turkey red dyeing in Scotland (Tarrant, 1987). First, she concludes that British dyers initially failed to reproduce the dyeing process because, as they did not understand the chemistry involved, they did not realise that pure ingredients were essential and used cheaper, lesser quality ones. Second, she examines conflicting claims regarding the discovery of the discharge process as a method for printing coloured patterns on cloth dyed Turkey red (the design on the sample in Figure 8 was achieved through discharge printing), a discovery she describes as a 'technical breakthrough' for the industry (Tarrant,

1987, p. 41). Daniel Koechlin of Mulhouse, Alsace, patented the method in 1813, but Tarrant cites a letter which states that Glasgow dyer George Rogers introduced his version of the process at Barrowfield dyeworks, Dunbartonshire, in 1802. However, a lack of corroborating evidence about Rogers' work leaves Tarrant unable to resolve this question.[19] Third, Tarrant studies the UTR pattern books to demonstrate how the Leven firms produced designs which accommodated local cultural and religious sensitivities in each of their overseas markets. She concludes, 'all that remains of this once very important industry are some two hundred sample books' (1987, p. 47), i.e., the ones at NMS, thereby overlooking the substantial body of UTR business records and pattern books in the Scottish Business Archive in Glasgow. This omission highlights that a lack of signposting by institutions to associated records held elsewhere risks impacting user discovery and interpretation of collections. Sally Tuckett and Stana Nenadic (2012) also examined the designs in NMS's UTR pattern books to rigorously assess Scottish Turkey red industry design practices. By triangulating data from the pattern books, other company records, Board of Trade design registers and newspaper articles, the researchers convincingly challenged historian David Bremner's assertions, adopted as 'a commonplace in studies of the Turkey red industry' (2012, p. 177), that designers repeatedly recycled designs and lacked creativity. While Tuckett and Nenadic concede that designers did largely adapt existing motifs rather than devise new ones, they found evidence in the pattern books for design development, market testing and the role of overseas agents as trend advisers. Tuckett and Nenadic's research shows the value of drawing on a variety of sources to contextualise and analyse data in pattern books and gain insights into historical issues associated with textile manufacturing, and hence the need to be able to discover what sources exist.

Another researcher who has juxtaposed pattern book data with newspaper articles, Parliamentary reports and design registration records to learn about manufacturing and verify or contradict historical events is textile conservator, museum curator and academic researcher Philip Sykas, who is an eloquent advocate for the informational and evidential value of pattern books. While his research concentrates on records from the North-West of England, his research methodologies are applicable in other contexts and illustrate the diversity of research questions pattern books can inform. For example, Sykas (1999) demonstrated how pattern book samples, contemporary illustrations and surviving clothing

[19] Wertz (2024, pp. 76–80) examines this question in depth and shows that credit for inventing the discharge process was claimed by several parties in Scotland. She confirms that Koechlin knew of the Scottish method and sought to adapt and improve it.

can be correlated to date either the records or clothing: Tuckett and Nenadic (2012) employed a similar comparative process using Board of Trade design registers to provenance Turkey red pattern books. Sykas interrogated costings in an 1820s Birkacre printworks pattern book to test claims in contemporary newspapers about the impact of calico duty on production costs, wondering whether they had been exaggerated for effect. The pattern book evidence proved they were accurate (Sykas, 2007). Overall, his research confirms his assertion that pattern books 'form an outstanding resource for exploring and understanding the history of textiles in Britain' (Sykas, 2001, p. 167).

Heritage science

As well as serving as sources for historical research, pattern books and their textiles can be analysed by heritage scientists, who apply an array of tools to identify fibres, trace ingredients in dyes, mordants and glazes, unpick manufacturing processes and assess preservation risks. Where no written records survive describing a firm's working methods, these analyses can provide at least some information. Where records do survive, the results can be compared to the textual evidence to ascertain how closely recipes and processes were followed in practice, or how complete the account of them is. While researchers have studied textiles under microscopes for many decades, the availability of more advanced technologies since the 1980s has opened new avenues for analysis (Cardon, 1998). This section introduces the range of questions heritage scientists are asking of pattern books and textiles and shows how their findings are deepening current knowledge about past skills, technologies and business organisation. The scientific methods used will not be discussed here, as they are covered in chapter 4.

Heritage scientists analyse textiles to identify what type of fibres they have been woven from, count thread density and judge the quality of the product. This information helps them ascertain the type of cloth, e.g. Britannias (otherwise Irvine linen) and assess the markets a manufacturer operated in, or where they sourced their yarn. Satchell and his colleagues (Satchell *et al.,* 1990) examined cloth fibres from a show book compiled c.1769 by Kendal woollen manufacturer John Crewdson. The fabrics are hardwearing cloths worn by working people; the type of cloth which only survives in pattern books, as the clothes were worn to rags, and then used as rags. The researchers used microscopy to classify the fibre types and yarn twist, count the threads per centimetre and measure the diameter of selected wool fibres. The researchers wanted to identify what breed of sheep the woollen yarns came from, to gain insights into Crewdson's supply chain, but the fibre analysis was

inconclusive, hampered by an absence of comparative data for English, eighteenth-century fleece fibres. However, the researchers demonstrate the value of combining scientific analysis with archival research. They studied data in contemporary wool purchase ledgers belonging to Kendal hosiers Christopher Wilson and Thomas Crewdson (a relation of John Crewdson), which listed the places Wilson and Crewdson sourced their raw wool, and in what proportion. The ledgers showed that the hosiers also purchased ready-spun yarn, locally and from Germany. Confident that John Crewdson sourced his wool from the same places, the researchers were able to propose breeds of longwool sheep farmed in these areas as potential sources.

The Crutchley family were dyers in eighteenth-century Southwark, London. When their archive was donated to Southwark Archives, not much was known about the business, so Quye, Cardon and Balfour Paul (2020) studied the records, analysed textile samples and researched the company's history. To identify the type and quality of the cloths Crutchley's dyed, they unscrambled the heavily abbreviated cloth names in the pattern books and examined the samples' weave structures. From this they ascertained that the firm mostly dealt with bays and shalloons, types of medium quality wool fabrics. They also identified fine quality wool fabrics woven in the West of England, observing the very fine spun warp threads which gave the cloth a high thread count and hence its quality. The researchers used liquid chromatography to analyse the dyes and mordants present on fibres from the cloth samples, to determine whether the samples' colours are true to their original appearance and whether the dye recipes were strictly followed. For two dye books from 1738-1744, the results established 95% accuracy between the dyes detected chemically and those listed in the written recipes. However, for a dye book dated 1722, accuracy dropped to 36%. The researchers posit several reasons for the discrepancies, such as the deterioration of light-sensitive dyes, not listing ingredients used in routine processes, error or deliberate omission. They underline that research conducted on the 1722 dye book based only on the written recipes and visual assessment of the colours would not be working with accurate raw data, resulting potentially in erroneous conclusions. The researchers' findings established that the Crutchley archive is a rich repository of scarce information about commercial dyeing practices in eighteenth-century London and led to

the collection being inscribed in the UNESCO UK Memory of the World Register (UNESCO, 2020).[20]

Alcántara-García and Nix (2018) analysed a Norwich worsted dyer's pattern book, dated c.1790-1793 and belonging to J. Tuthill & Son. Little is known about Norwich's eighteenth-century worsted dyers' methods, as few records survive. Alcántara-García and Nix used spectroscopic, microscopic and chromatographic techniques to detect mordants and dyes present in the samples and FTIR (a type of spectroscopy) to name the substance applied to callimanco (a thin woollen cloth) samples to produce their characteristic glaze. The glaze analysis was inconclusive but suggested a natural gum like gum arabic or gum tragacanth, both widely used by dyers in that period. The results for the dyes and mordants showed that Tuthill & Son employed a consistent repertoire of recipes, leading the researchers to conclude that perhaps the dye recipe books never existed, as the dyers did not need to document their recipes and passed them on orally. Alcántara-García and Nix cross-checked their scientific findings with archive data on the dyes, mordants and dyeing chemicals in use in the 1790s, gleaned from contemporary Norwich newspaper advertisements promoting sales of stock from dye workshops. Alcántara-García was involved in a similar project to investigate the source of dyes and mordants present in Viennese silk manufacturer Benedict Codecasa's late eighteenth-century sample book, which takes the form of a folding card. Through XRF spectroscopy and liquid chromatography, the researchers ascertained that most of the ingredients would have been sourced within the Austro-Hungarian Empire. The results showed that, unlike Tuthill, Codecasa (or the yarn dyers from whom he sourced yarn) varied his recipes to match colours on batches of cloth (Thomas, Alcantára-García and Wouters, 2017).

The chemical processes used in historic dyeing potentially have implications for the preservation and display of historic textiles, but some are not well understood. Conservation concerns underpinned Julie Wertz's investigations into the chemistry of Turkey red dyeing. It was not known whether the process degrades the cotton fibres, nor did conservators have a test to confirm whether a red textile is fade-resistant Turkey red or not, impacting preservation decisions. Wertz discovered that FTIR spectroscopy and ultra-high-performance liquid chromatography (UHPLC) can clearly distinguish Turkey red fabrics from fabrics dyed by other means. She also analysed Turkey red oil, to unravel the

[20] UNESCO's inscription described the collection as a 'fascinating, information-rich and visually-stunning legacy of the UK's textile heritage with a unique family provenance' (UNESCO, 2020).

operation of fatty acids in the dyeing process and gain insights into the chemical changes effected on the cotton fibres. She concluded that her findings were first steps in understanding the nature of Turkey red's light fastness and would help conservators care for these textiles appropriately (Wertz *et al.*, 2017; Wertz, France and Quye, 2018).

Creative practice

In addition to being mined for historical and technical data, textile heritage collections are used to support learning and as inspiration for new creative and commercial outputs. Lecturers delivering textile design and fashion courses recognise that student creative practitioners benefit from engaging with, learning from and responding to textile archives. Historic patterns and dress teach students about pattern cutting, remaking and embellishment, and prompt them to think about sustainability and reuse. Tactile engagement with textiles allows students to experience how fabrics feel and move (Hackney *et al.*, 2020). Through a collaborative project with Bolton Museum, University of Bolton Textile and Surface Design students were able to place pattern books in their wider social, industrial and historical context. As they immersed themselves in the collections, focused on creating outputs for exhibitions and products for the museum shop, the students began to view themselves as professional designers. They also became enthusiastic ambassadors for the museum (Claypool, 2020). Younger students also engage creatively with textile archives. In 2016, in conjunction with the Brewery Arts Festival, Year 3 pupils from Stramongate School in Kendal studied the patterns in the Crewdson pattern book discussed above, and also examined a local Quaker tapestry. Taking inspiration from these historic textiles, the pupils wove their own runner (Brewery Arts, 2016).[21]

Commercial textile designers draw on historic pattern books and textiles to produce new products. A Turkey red sample book belonging to William Stirling and Sons was at the heart of *India Street Bazaar*, a collaborative project exploring ethical, sustainable fashion and organised as part of the British Council UK-India 2017 year of bilateral cultural exchange. Artists and designers from India and Scotland studied the samples together and responded by designing new garments and homewares, which were manufactured with the assistance of small-scale producers in India (British Council, 2017). Luxury fashion house Hermès drew inspiration from Paisley shawls and 1830s pattern books held by Paisley

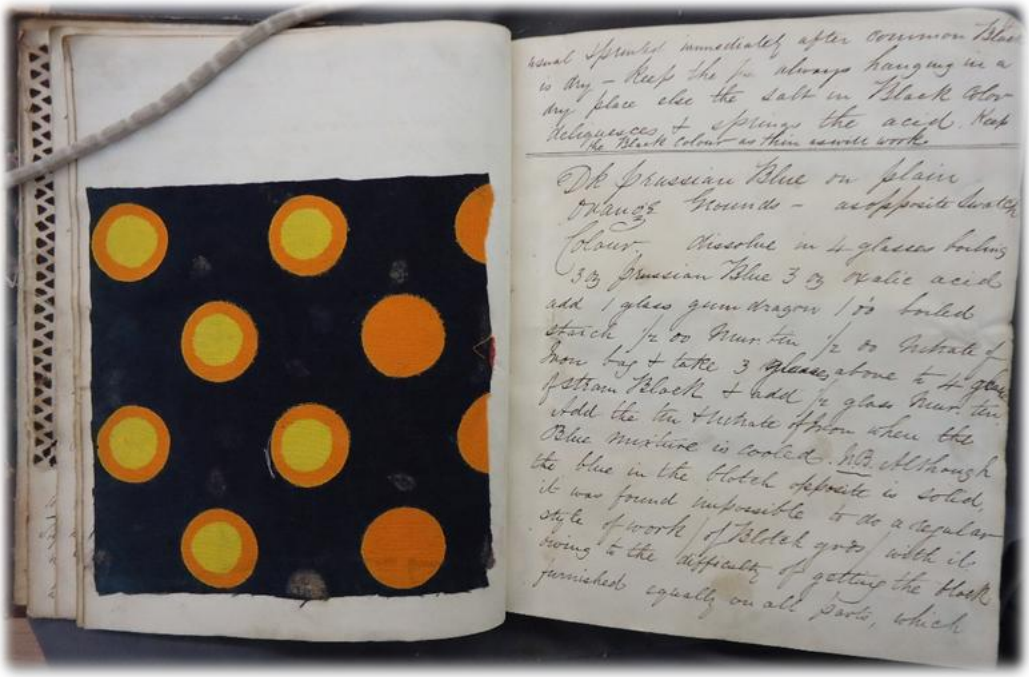
[21] Quaker tapestry www.quaker-tapestry.co.uk (accessed 18 Aug 2024).

Museum for a new range of cashmere and silk scarves and enamel bracelets. In this 'seemingly unique partnership between a Scottish local council and a Parisian fashion house' (Brooks, 2019) Renfrewshire Council saw, Brooks suggested, an opportunity to use Paisley's heritage to help revive the town. High street retailer Oasis worked with Nottingham Trent University students to produce a clothing collection inspired by the University's lace archive, launched in October 2017 (Hackney *et al.*, 2020). Textile maker-designer Michelle Stephens applies a generative digital design process to historic pattern book samples to create new designs for woven cloth, employing AI algorithms and computer programming to break apart the original design and rebuild its components into something new. The qualities of her new, digital, designs, and customer requirements, inform the choice of yarn, colours and weaving structures for her multi-layered fabrics, which are woven on jacquard looms (Stephens, 2023).

Conclusion

Historic textile manufacturing made a significant contribution to Scotland's economy, shaped landscapes and communities in ways that still resonate today and fostered technological innovations which transformed manufacturing processes and products. The evidence which survives, in the form of textiles, equipment, infrastructure and archives, is partial and uneven in its coverage, but preserves valuable information for interpreting the past and stimulating new ideas. Company archives, especially pattern books and their textiles, attract diverse audiences, including historians of business, economics, society, fashion and design; heritage scientists; commercial designers; and creative practitioners. They help residents in former textile manufacturing communities connect with their town's past and forge new stories for their future. They inform the preservation and repurposing of redundant weaving sheds, dyeworks and lades. But textile collections are not easy for archivists to manage. Finding appropriate storage for hefty volumes is tricky when space is tight and staff require a level of expert knowledge of the industry's processes to assess pattern books' functions and what their samples represent. Although funding to deliver cataloguing or digitisation projects is scarce, digital resources can help archivists facilitate access to textile collections and assist researchers to interpret them. They can also virtually unite dispersed collections and bring archives back into dialogue with associated artefacts and buildings. Advanced technologies offer exciting possibilities for fostering learning about pattern books, textiles and historic textile manufacturing. This research project asks what benefits the digital sphere provides for pattern books and textiles,

examines what effective digitisation and description would look like for these sources, and considers how these tasks might be achieved.



Calico printing was a precise art, or more accurately, a science involving complex chemistry. Colours had to be chemically fixed into the fibres so that they did not wash out. Ingredients were carefully measured, water temperatures controlled and steeping, washing and drying timed. Despite this care, colouring sometimes went awry. The printer of the pattern above complained that 'the difficulty of getting the black furnished equally on all parts' had resulted in greenish patches on the dark blue background, so he had to find a workaround to achieve a uniform colour.

Figure 9. Recipe for printing a Prussian blue and orange pattern on calico, Milton printworks, c.1837 (NLS MS.17983)

Chapter 2 Methodology

Introduction

Researchers accessing archives in person see how they are constructed, experience how they function and consciously and unconsciously absorb material-based information through sight, hearing, touch, sound and smell. But knowledge-making through physical interaction is not possible when accessing digitised records, and researchers' ability to interpret physical qualities and context is dependent on how institutions have digitised, described and published their records, as well as learning gained from any past, physical encounters. For many archivists, cataloguing's function is principally to explain administrative context, so they rarely include a description of a document's physical properties. Digitisation, especially of modern records, prioritises content and likewise overlooks the material characteristics of the record artefact. Consequently, the online researcher can be left with a very incomplete picture (Treharne, 2013; Rekrut, 2014). This contrasts with library practices for describing and digitising manuscripts and rare books, which prioritise form, structure and appearance. This chapter sets out the project's research aims and questions, designed to investigate archival materiality and practices for communicating material properties digitally. It explains the choice of a qualitative case study methodology, describes how interviews, documents and a survey were used to gather data, and outlines the process of data analysis. It concludes with a discussion of 'effective practice' and the project's ethical considerations.

Methodological framework

The primary research questions this project addressed are, 'Why do the material features of archives matter?' and 'How do archivists engage with archives as material artefacts?'. To help answer these questions, the project used pattern books as a case study, and explored how they embed evidence about their creation, function and use (their 'career'). They were also used to examine two secondary questions: 'How can archivists describe and digitally image pattern books and textiles to effectively represent and communicate their material properties and physical context?' and 'What are the affordances of the digital sphere for pattern books?'.

Qualitative methodology

A qualitative research methodology was chosen as the appropriate framework for the project context. Mason defines qualitative research as 'characteristically exploratory, fluid and flexible, data-driven and context-sensitive' (2018, p. 44). Braun and Clarke (2013, p. 20), Creswell (2013, pp. 46–47), Pickard (2013, chap. 1) and Patton (2015, chap. 2) concur on a set of characteristics that identify qualitative research. First, it examines a real-life situation in its natural setting and the researcher engages with participants in their environment. The researcher gathers the data themselves, after designing their own data collection instruments, and usually draws on multiple data sources. Next, analysis concentrates on the meaning that each participant holds about the issue, rather than on the researcher's own meaning, or ideas expressed in the literature. It starts with the specifics of the situation studied, then identifies themes inductively from the raw data; these are iteratively verified against the data. Analysis acknowledges the multiplicity of perspectives encountered in the data and reports the complex network of factors surrounding the situation. Lastly, the research process is emergent and open to change, evolving responsively during the project to obtain rich, effective data, while the researcher is reflexive, explaining how their own motivation and background inform their process. Gray describes qualitative research as 'intense, engaging [and] challenging'; he considers that qualitative data 'can be a powerful source for analysis', because it explains how and why something happens and conveys participants' emotions, prejudices and relationships (Gray, 2021, p. 176).

Case study research

Stake (1995), Creswell (2013), Shanks and Bekmamedova (2013), and Yin (2018) agree that case study research is appropriate to explore a contemporary, real-life, concrete situation in depth, within its context, to answer 'how' and 'why' questions. Yin (2018, p. 31) and Patton (2015, p. 260) underline that the boundaries of the case being studied need to be clearly defined, as they distinguish the subject of the case from its external context. Shanks and Bekmamedova (2013, p. 173) emphasize that the research should include the experiences of the stakeholders involved. Case study research may study a single case, for example, an archive-based creative writing programme, to develop a comprehensive understanding of the chosen example (what Stake (1995) defines as an 'intrinsic case study'), or start with an issue and examine one or several cases to illuminate facets of that issue (Stake's 'instrumental case study'). Regardless of the number of cases, Stake (1995),

Creswell (2013, p. 101) and Gray (2021, p. 291) point out that the particularities of each case are central to the study and the analysis should describe those particularities in depth, as well as each case's context and the themes which the researcher has identified. In a study involving several cases, the researcher looks for patterns across the cases and considers how they contribute to knowledge about the issue being studied. For Yin (2018, p. 38), the aim of case study research is to expand and generalise theories about situations.

A case may be chosen either because it is unusual or because it is represents one instance of a broader category of cases (Bryman, 2012; Yin, 2018). Creswell (2013), Patton (2015) and Stake (1995) recommend the use of *purposive*, or *purposeful*, sampling to select cases. In multi-case studies, this means that each case is specifically chosen because it will provide rich data and a fresh perspective on the issue, and represent a different category within the field, although realistically, a handful of cases can only ever be nominally representative. Gray (2021, p. 233) warns about subconscious bias on the part of the researcher when selecting cases. Yin (2018, p. 55) rejects purposive sampling in multiple case study research. Instead, drawing on experimental testing, he believes that cases should test the replication of a theory, so a case is chosen either because the researcher predicts it will produce similar results to a prior case and therefore substantiate the findings, or because they anticipate it will produce different results for stated reasons. Case study data should be obtained from several sources and triangulated to ensure that each finding is backed up by more than one piece of evidence (Yin, 2018, p. 128). Patton (2015, p. 14) and Stake (1995, pp. 60–68) recommend interviews, observations and written documentation as suitable data sources. Creswell (2013, p. 160) adds in audio-visual materials, including images, sound recordings and websites. Yin (2018, p. 114) proposes six types of sources: interviews, direct observation, participant observation (where the researcher actively participates in the situation being studied), documentation, archival records and physical artefacts.

Use of qualitative case study methodology

The author decided that a qualitative case study methodology was suitable for her project because she was studying the real-life, contemporary issue of archival digitisation and wanted to answer 'how' and 'why' questions about professional theory and practice. She investigated multiple cases to gain insights into the issue from several angles. Each case was chosen chiefly because of the nature of its imaging, descriptive and/or access activities, but also to reflect the diversity of the archive sector and provide a mix of

institution type and size. The selection of the cases is discussed in Research Methods below. The boundaries of each case were clearly defined, with enquiry focusing on how description and imaging provide digital access to archival collections; other access activities such as exhibitions and learning programmes were not in scope. The author's research process followed qualitative parameters. She wrote her own interview questions, collected the data herself and spoke to participants in their workplace or homeworking space. For each case, the author gathered data from several sources (overview in Table 3) and described each case's particulars and context in depth. Analysing the data, she was alert to potentially valuable themes beyond her core topics of cataloguing, digitisation, access and materiality, and her coding embraced areas such as finance, staffing, attitudes to technology and institutional profile (the Data Analysis section explains the coding process). Her findings identified patterns across the cases, for example, how access to in-house technology and IT expertise makes the provision of digital access more achievable, but respected each case's context and participants' perspectives. The author adopted a fluid approach for her project. As discussed under Research Methods, instead of choosing all the cases at the start, she undertook three case studies, reviewed the findings and then selected further cases which would augment the data. Part-way through, she decided to concentrate on the archive service perspective, rather than include analysis of the user experience; consequently, she examined two digital access case studies, which supplied valuable data about practices embracing rich description and collection browsing. Notwithstanding, she took care to balance flexibility with the necessity to fulfil the project's academic requirements within the limited timeframe of doctoral research.

Positionality

In qualitative research, the researcher's subjective view of their topic and the influence their personal experiences and worldview have on their data collection and analysis are valued, but need to be consciously recognised (Braun and Clarke, 2013; Seidman, 2013; Gray, 2021). Seidman observes, 'All responses to a text are interactions between the reader and the text. That is why it is important that the researcher identify his or her interest in the subject and examine it to make sure that the interest is not infused with anger, bias, or prejudice.' (Seidman, 2013, p. 120). Reflexivity assists the researcher to recognise what they bring to the research process and how that shapes the avenues they do, or do not, explore, and the way they analyse their findings (Braun and Clarke, 2013, pp. 36–37). Gray (2021, p. 176) observes that the researcher's reflections on their research process and feelings about their work become part of the data. The researcher also needs

to reflect upon the nature of their position vis-à-vis the research site and participants. Walsham (1995) identifies two roles, 'outside observer' and 'involved researcher' (someone undertaking participant observation or action research). In his view, research participants tend to perceive the outside observer as someone they can speak to fairly openly, as the observer is not personally implicated in the research outcomes. Drawbacks of this role, Walsham suggests, are that the researcher does not see all that goes on within the case organisation and is not privy to operationally sensitive information. Conversely, Walsham's involved researcher benefits from insider knowledge but, because their role or research may influence organisational decision-making, study participants may be reticent. Walsham, Braun and Clarke (2013), and Creswell (2013) underline that, regardless of the researcher's position, the questions that the researcher asks or information they share about the purpose of their research will influence how participants respond. Le Gallais (2008) advises that few researchers are complete insiders or outsiders because, regardless of their formal position, their background and life experiences can create bonds, or barriers, with participants. She also warns researchers that their position can shift subtly during the research, especially if their engagement with the site or participants is long-term, and recommends the use of reflexive practices like journalling to monitor this.

As explained in the Introduction, the author undertook her research to address a professional question which had concerned her for some time. She acknowledged that her motivation and prior knowledge influenced how she approached her research (Braun and Clarke, 2013, p. 36; Herr and Anderson, 2015, p. 57). She has engaged actively with professional questions relating to cataloguing and access throughout her career and consequently brought extensive personal knowledge of, and views on, the research context to her studies. In addition, she recognised that her core premise that documenting archival materiality matters was subjective, albeit one rooted in archival theory. In conceiving of her project, the author was inspired by the practical ethos of action research, in which research is undertaken to improve practice and effect change, but, as the project did not implement changes within the author's place of work, it was not an instance of action research (Herr and Anderson, 2015; Gray, 2021, p. 344). Instead, the author's role was broadly that of Walsham's 'outsider observer'. She was not employed by any of the case institutions, nor known to any of the participants prior to the project; her contact with her participants was limited in most cases to one interview and a brief exchange of emails. She did not have to navigate any conflict of interest with colleagues (Gray, 2021, p. 348). But, as Le Gallais observed, her position had nuances. Although, as a doctoral student, she

stood outside the sector looking in, nevertheless, as an archivist with a longstanding interest in the sector's professional activities, the author had an insider perspective on sector issues. She was transparent with participants about her professional background, stating it in the participant information sheet; whether it altered participants' perception of what they could share, their sense of trust or level of confidence in the research is not possible to say.

Strengths and limitations of methodology

Adhering to recognised research methodology, methods and protocols provides the researcher with a good practice framework for their research design and delivery. Methodological protocols also help qualitative researchers to ensure, and demonstrate, that their research is credible, of good quality and able to be evaluated, and counter criticism that qualitative research is subjective and lacks rigour (Braun and Clarke, 2013; Patton, 2015; Yin, 2018; Gray, 2021). Since many qualitative researchers reject quantitative evaluation measures as inappropriate, the community has endeavoured to define its own criteria, but has not specified a standard set. Evaluative criteria first defined by Lincoln and Guba in 1985[22] - credibility, transferability, dependability and confirmability - have had longevity (Creswell, 2013, p. 246); authenticity and transparency are also used (Gray, 2021, p. 198). Creswell (2013, p. 249) highlights Whittemore, Chase and Mandle's choice of credibility, authenticity, criticality and integrity,[23] believing that they capture qualitative research's emphasis on reflexivity and critical awareness. Braun and Clarke, and Patton, believe that one, universal, set of criteria cannot be used to evaluate the quality and credibility of all theoretical approaches used in qualitative research; Patton (2015, chap. 9) has therefore produced a suite of seven separate evaluative frameworks for different orientations, while Braun and Clarke (2022, p. 269) have devised a fifteen-point checklist for testing the credibility of thematic analysis research. Stake, meanwhile, has published a twenty-point checklist against which the researcher can evaluate the thoroughness of their case study report (Stake, 1995, p. 131). Regardless of which assessment criteria a researcher prefers, accepted methodological strategies can assist them to demonstrate credibility, for example, triangulating data sources, member checking and the use of thick description (Braun and Clarke, 2013, chap. 12; Creswell, 2013, p. 250; Yin, 2018). Yin, and Braun and Clarke, also recommend maintaining a chain of evidence and documenting

[22] First defined in Lincoln, Y. and Guba, E. (1985) *Naturalistic Inquiry*. Beverley Hills: Sage.
[23] Whittemore, R., Chase, S. and Mandle, C. (2001) 'Validity in qualitative research', *Qualitative Health Research*, 11, pp. 522-537.

procedures explicitly, as these support transparency and allow readers to trace how the findings were arrived at.

Although Patton (2015, p. 678) acknowledges that methodological protocols contribute to sound research practice, he warns that working through checklists does not, by itself, make qualitative research credible and robust. Instead, Patton believes that quality is more effectively assured when the researcher's practice is rooted in the principles underpinning qualitative research, such as reflexivity, transparency, ethical conduct and owning decision-making. Walsham (1995) and Yin (2018, p. 35) observe that, if the researcher feels obliged to adhere strictly to methodological frameworks, they risk becoming constrained by the methodology and afraid to act creatively, even though doing so may lead to valuable insights. As Walsham explains, 'There is a danger of the researcher only seeing what the theory suggests, and thus using the theory in a rigid way which stifles potential new issues and avenues of exploration.' (Walsham, 1995, p. 76). As a responsive approach is a core characteristic of qualitative research, the qualitative researcher requires a creative methodological flexibility which is not stifled by zealous adherence to protocols, nor undermined by methodological freewheeling, which could introduce flaws. Despite offering his suite of quality frameworks, Patton (2015, p. 703) concludes that good quality, credible, qualitative research ultimately depends on critical, creative, thinking underpinned by intellectual rigour.

Research methods

Research context: Covid-19 pandemic

This research project was conducted during the Covid-19 pandemic, which influenced the research design, implementation and participants' perspectives. Project planning took place in 2020-2021, during a series of national and regional lockdowns implemented to limit the spread of infection. It was clear that the design would have to be flexible and responsive to a sometimes rapidly changing situation, the trajectory of which was unknown. Research methods had to be deliverable digitally, as there was no guarantee that in-person meetings and activities would resume within the timeframe of the project's data gathering phase. Participants' contributions need to be understood within that very specific context. Most of the case studies interviews were conducted in 2022, as services were gradually re-introducing full onsite access after two years of restrictions, uncertainty and change. Although it was too early for participants to comprehend the long-term

impact of the pandemic on their services, it was clear to many that it had brought lasting change. Selected digital practices introduced through necessity had become embedded, such as remote appointments for readers and hybrid working, and were likely to remain. Audiences' expectations around digital access to services, activities and resources had increased, while GLAM staff had acquired new insights into what was possible digitally. These issues were explored in the case studies.

Literature review

The author commenced her project by reading extensively to build a firm theoretical and methodological foundation for the research (Williamson, 2013b; Gray, 2021); she continued to engage with a range of literature throughout her studies. The literature encompassed her project topics, namely, archival theory and practice relating to materiality and digital representation; library and Digital Humanities theory, practice and scholarship on cataloguing and digitising rare books and manuscripts; digital materiality theory, digitisation and digital access; and textile heritage research and heritage science. Engaging with the literature deepened the author's familiarity with the historical context of each topic, especially digital materiality theory and heritage science, which were new to her, and introduced her to leading voices, sources and debates, as well as alternative viewpoints. It acquainted her with the range of methodological approaches available, highlighted their advantages and disadvantages, and provided examples of their practical application. The literature showed the current state of knowledge in the fields in scope and suggested how the proposed research would relate to what had already been done and enhance existing knowledge (Bryman, 2012; Williamson, 2013b; Hart, 2018).

From her reading, the author could see that a case study methodology, with its thick description, focus on case particularities and concern for context would be a good fit for her topic and field. The literature revealed the wealth of digital initiatives scrutinising material features of cultural heritage artefacts and demonstrated that rich engagement with materiality in the digital sphere was possible, thereby confirming that the proposed project was viable. It also highlighted the Glasgow School of Art and Natural History Museum as potential cases. The literature illustrated that gaps existed in the field. First, although theorisation about digital materiality, representation and digital translation occurs in Digital Humanities, it is very limited in archival discourse. Second, investigations into materiality, and archivists' engagement with physical records, are largely absent from archival studies. Third, archivists lack guidance on how best to describe the material

properties of records, including pattern books, within context-focused, ISAD(G)-compliant tools. Fourth, virtually nothing has been published on how researchers search for, discover and access pattern books, or how they interact with these records digitally. Identifying these gaps assisted the author to formulate her research questions and methodologies (Williamson, 2013b).

The author used a number of strategies to find relevant literature and engage with a spectrum of voices. She starting by reading core texts in each field, then items which their authors had cited. For example, having read Lester's impactful article on archival materiality, 'Of mind and matter: the archive as object' (Lester, 2018), the author studied his PhD thesis and reviewed texts he had referenced. She followed up recommendations by supervisors and peers. Keen to engage with voices beyond those frequently cited, and anxious to ensure that perceived gaps really were gaps, she searched the back catalogue of leading journals in each field, for example, *Archives and Records, The American Archivist* and *Archivaria* for articles on archival theory and practice, and *Textile History*, *Costume* and *Scottish Business and Industrial History* for textile heritage research. Further, she combed the bibliographic databases Library and Information Science Abstracts (LISA) and Connected Papers, read conference papers and physically browsed the University Library bookshelves. Having approached researchers whose ideas she had found particularly thought-provoking to discuss their work directly, for example, archivists Peter Lester and Sue Breakell, archaeologist Stuart Jeffrey, textile designer Donna Claypool and researcher Alison Wiggins, she also pursued their reading suggestions.

Rather than present the literature review in a dedicated chapter, the author decided to situate her review of literature pertaining to each topic within the related thesis chapter, so that there was a dialogue between the literature and the associated project research and findings. The author established selection criteria to determine which literature to review, based on her research aims and questions. To analyse materiality's place in archival theory, discourse and practice, she reviewed theoretical discourses on the conceptualisation of records, the role of archival description and function of materiality (for example, articles by Yeo, Cook and Buchanan, see chapter 3). She also examined what archival researchers such as Farge (2013) and Henderson (2023) said about the contribution of material evidence to their research. Two significant contributions to discussions about material-centred archival research and practice, Breakell and Russell (2023) *The Materiality of the Archive: Creative Practice in Context*, and Prescott and Wiggins (2023) *Archives: Power, Truth, and Fiction*, were published at the end of 2023. While they appeared too late to

inform the data collection, chapters were incorporated into the literature review and their ideas enriched the overall discussion and findings. For digital materiality, representation and digital access, the focus was on literature theorising digital environments and practices (for example, Kirschenbaum, 2012) and examples of material-centred, digital-enabled research into textual and textile heritage, e.g. Endres' analysis of the St Chad Gospels (2019); this material was reviewed in chapters 4 and 6. Within textile heritage, priority was given to research and creative practice involving pattern books, from West of Scotland companies, where possible; historical research and creative re-use were reviewed in chapter 1, while heritage science was discussed in chapters 1 and 4.

Case studies

As the Methodological Framework explained, the principal research method used in this project was the case study. A set of five case studies (the 'institutional' case studies) explored questions relating to cataloguing, digitisation, digital access and materiality within five cultural heritage institutions through semi-structured interviews with staff; these are analysed in chapter 5. Two further case studies focused specifically on digital access, examining how the case organisations had enriched their cataloguing approach to improve access to their collections and the challenges they faced making collections metadata and digital resources available online (evaluated in chapter 6). The method's approach of studying case particularities within their context is well-suited to the UK archive sector, which is very diverse in terms of governance, funding, staffing, remit and core audiences. Services may be operated by central or local government, charities, businesses or other public or private bodies. Some employ several professional staff and can afford expensive software and equipment; others rely wholly on volunteers and struggle to procure basic equipment to store and manage their archives. Core audiences may be internal, for example, a company archive may exist primarily to support internal business functions, or largely external, often the case with local authority record offices (Scottish Council on Archives, 2022). Full details of each case's operating context and strategic goals are given in the case reports in chapter 5. To enhance the transferability of the case studies and allow archivists to assess whether and how findings might work in their specific context, each case's context has been described in detail.

Purposive sampling was used to select cases whose digital activities addressed the research questions, could inform digital access to pattern books and textiles, and which represented different facets of the sector. Three institutions were chosen initially: the University of

Glasgow's Archives and Special Collections (ASC), the National Library of Scotland (NLS) and a third organisation, which declined to participate; the Natural History Museum was substituted. ASC was chosen, first, because the service was using streaming technology to deliver innovative teaching, research and engagement activities, and second, because of staff initiatives to describe designs on pattern book textiles. The NLS's ambitious target to provide digital access to one-third of its collections by 2025 (National Library of Scotland, 2015b) made it of interest. Meanwhile, the Natural History Museum's announcement in January 2022 that it had digitised its five millionth specimen (Ashworth, 2022) sparked the author's curiosity. She was amazed to learn about NHM's deployment of computer vision and other advanced technologies to fulfil its intention to digitise all eighty million specimens in its collections; recognising their potential for digitising pattern books and processing archival metadata, she adopted NHM as a case. Once the findings from the first three cases were assessed, the author decided to investigate two further institutional cases. The National Library of Scotland and Natural History Museum are generously resourced,[24] state-owned organisations delivering mass digitisation programmes, while the University of Glasgow is a Higher Education Institution with access to IT specialists, reasonable levels of funding and partnerships with researchers. Therefore, for the remaining cases, the author chose two small-scale organisations in other sectors, suggested by her supervisor Quye. Southwark Archives, run by Southwark Council, has aspirations to expand public access to its collections but operates within the resource and policy constraints of local government. It was chosen over all the other local authority record offices in the UK, because it holds the UNESCO-recognised Crutchley collection, the business archive of a firm of wool dyers operating in eighteenth-century Southwark. The privately-run Sunny Bank Mills Archive manages the records of Edwin Woodhouse & Co. Ltd., a now-defunct textile company, whose owners have repurposed the mill buildings while maintaining the company's heritage at the heart of the new enterprise. Both organisations have few staff, no online catalogue and tight resources.

As the project progressed, it became clear that it would be helpful to provide examples of effective practice of material-focused digital access, so the author undertook two case studies exploring how the Glasgow School of Art (GSA) and Chatsworth Archives enriched access to their collections. The author's interest in GSA was sparked by Magee and Waters' article, 'Archives, artists and designers', in which Waters discussed how GSA

[24] By this is meant that they employ, or can buy in the services of, many people skilled in collection management, metadata development and information technology, and have access to high-specification equipment and collection management software.

textiles staff wanted to browse the School archives serendipitously by colour and design, but found the catalogue did not facilitate this (Magee and Waters, 2011, discussed in chapter 6). When, in June 2022, GSA Archives launched its new catalogue and website, designed to facilitate visual browsing and serendipitous discovery, it was evident that this initiative was worth studying in detail. Professor Alison Wiggins, University of Glasgow, alerted the author to Chatsworth Archives' project, *The Devonshire Inheritance: Unlocking the Cavendish Family Papers* (ran 2021-2022), which employed a detail-rich cataloguing methodology to enhance discoverability and public access. After studying the outputs and documents explaining the project's objectives and delivery, the author decided that Chatsworth's methodology offered another useful perspective on digital access.

Case institution	*Interviews*	*Meetings*	*Site visit*	*Document analysis*	*Digital resources analysis*
National Library of Scotland	Yes	Yes	Yes	Yes	Yes
Natural History Museum	Yes			Yes	Yes
Southwark Archives	Yes			Yes	Yes
Sunny Bank Mills	Yes		Yes	Yes	Yes
University of Glasgow	Yes	Yes	Yes	Yes	Yes
Chatsworth		Yes		Yes	Yes
Glasgow School of Art		Yes	Yes	Yes	Yes

Table 3. Data collection methods used in the project

Interviews

For the institutional case studies, semi-structured interviews were chosen to generate detailed descriptive data. Interviews allow the researcher to learn from those involved about the strategic priorities and practical challenges which shaped what was done, and how (Shanks and Bekmamedova, 2013, p. 173). A semi-structured format enables each interview to be tailored to each participant's role and area of expertise, and provides space for a responsive, nuanced discussion, while ensuring that the same topics are covered in each interview for comparison (Pickard, 2013, pp. 196–197; Patton, 2015, p. 439). During the planning phase, a master list of interview questions was prepared, covering

cataloguing, digitisation, digital access, materiality and institutional priorities (see Appendix Two) and informed by the literature and the research questions. The draft questions were shared with the author's supervisors for feedback. As she conducted the interviews, the author took on board how the questions were being received and refined the wording as necessary. Prior to each interview, after researching each organisation's strategy, policies and online resources, the author selected a subset of questions and, if required, amended the wording to reflect the interviewee's role and the organisation's activities. For some interviews, additional questions were devised to explore a case-specific issue, such as the University of Glasgow's use of visualisers.

The institutional case study participants were selected because of their organisational role and activities (Table 4 lists all the case study participants). Individuals were identified from their publications or public engagement activities, their employer's staff directory, or personal recommendations by the author's supervisors and other contacts. For the NLS and, in part, the UofG, the author employed the 'snowball' approach and asked her initial contact whether they could propose colleagues with requisite knowledge. The author was aware that colleagues holding similar views might be suggested, leading to a one-sided impression of organisational activities and opinions (Williamson, 2013a, p. 344; Patton, 2015, p. 298). In the end, the roles of those suggested, and the views they expressed, indicated that any skew was limited or non-existent. In 2019, when she was scoping her doctoral research, the author made contact with the National Library of Scotland's Digital Scholarship Librarian, Sarah Ames. Ames was on extended leave during the project's data collection phase, so she did not participate in an interview, but she shared information about NLS' digital scholarship activities. She also put the author in touch with NLS' Digital Transition Manager, who was leading the Library's mass digitisation programme. In turn, the Digital Transition Manager proposed two members of staff with expertise in creating, applying and managing metadata for physical collections, digitised material and born-digital collections. At the University of Glasgow, Clare Paterson, the author's liaison person in Archives and Special Collections, recommended the Senior Assistant Librarian responsible for overseeing ASC's digitisation programme and Stephen McCann, Head of the University's Photographic Unit, which undertakes all ASC's digitisation work. The author approached Assistant Librarian Robert MacLean directly, having heard him speak about his role in introducing visualisers for teaching and collections access in ASC. Her informal meeting with Sam Dyer and India Fullarton, the photographers who fulfil ASC's digitisation requests, was unplanned and resulted from Covid. When the author arrived for

her in-person interview with Stephen McCann, he had just been informed that a close contact had tested positive for Covid-19, meaning that, in line with national guidelines in place at that date, Stephen had to self-isolate. To compensate for postponing the interview, he asked Sam and India to provide a tour of the digitisation suite and describe their digitisation processes. The author arranged a meeting with the Assistant Archivist responsible for managing EMu, ASC's collection management system, to learn how ASC had configured the software and overcome the challenges staff encountered when importing data from existing catalogues.

Anita Quye, one of the author's supervisors, provided names of potential interviewees at Southwark Council and Sunny Bank Mills. The author interviewed two people within Southwark Council with detailed knowledge of the Crutchley collection and operation of the Heritage department; one subsequently withdrew from the study. At the time of the interviews, Sunny Bank Mills Archive only had one permanent member of staff, Archive Curator Rachel Moaby, who manages the Archive, while an Archive Digital Curator was in post to help deliver the Archives' NHLF-funded *Weaving the Web* project; the author interviewed them both. For the Natural History Museum case, the author identified the participants through material they published. Having read papers on NHM's specimen digitisation programme, the author approached one of the co-authors, Vincent Smith, because he was leading the digitisation programme and its application of new technologies. A post on the Jisc archives-nra listserve by NHM's Digital Special Collections Librarian, Ceri Pollard, on the Museum's crowdsourced transcription project, alerted the author to the potential of this activity; she therefore asked Pollard whether she would be willing to be interviewed.

For the interviews with staff from GSA Archives and Collections and Chatsworth Archives, questions for each case were tailored for each institution and the activities in scope, but they adapted some of the institutional case interview questions. The author approached Susannah Waters, formerly Archives and Collections Manager at GSA (who had left the institution in 2022), to ask whether she would be willing to explain how GSA had acted on the learning outlined in Waters' 2011 article about collections access for creatives (Magee and Waters, 2011). Waters proposed that Michelle Kaye, Collections Lead at GSA, who had led the development of GSA's online catalogue, be part of the conversation, so the author interviewed them jointly. In the Chatsworth case, the author wanted to explore the in-depth cataloguing approach the service had adopted for its Cavendish project, as well as wider questions relating to materiality and digital access, and

reached out to Chatsworth's archivist, who manages the estate's archive and library collections and had designed and overseen the Cavendish project.

Institution	Name and role
Chatsworth Archives	Head of Archive and Library
Glasgow School of Art	Michelle Kaye, Collections Lead
Glasgow School of Art	Susannah Waters, formerly Archives and Collections Manager
National Library of Scotland	Sarah Ames, Digital Scholarship Librarian
National Library of Scotland	Carol Campbell, Head of Metadata
National Library of Scotland	Digital Transition Manager
National Library of Scotland	NLS staff member
Natural History Museum	Vincent Smith, Research Leader and Head of Division, Informatics
Natural History Museum	Ceri Pollard, Digital Special Collections Librarian
Southwark Council	Southwark staff member
Sunny Bank Mills	Rachel Moaby, Archive Curator
Sunny Bank Mills	Archive Digital Curator
University of Glasgow	Sam Dyer, Collections Photographer
University of Glasgow	India Fullarton, Collections Photographer
University of Glasgow	Stephen McCann, Head of Photographic Unit
University of Glasgow	Robert MacLean, Assistant Librarian (Engagement and Rare Books)
University of Glasgow	Assistant Archivist: cataloguing
University of Glasgow	Senior Assistant Librarian

Table 4. List of case study participants

In interviews, the level of trust established between researcher and participant, the wording and relevance of the questions, and the researcher's responses to what the participant shares, all influence what information the participant imparts and their willingness to be open (Lincoln and Guba, 1985, p. 100). The author was not known to any of the participants prior to the interviews, so trust and rapport had to be established through their initial email exchange and during the interview itself. In her introductory email, the author explained the background and aims of her project and why she wished to interview the subject. She prepared thoroughly for each interview, familiarising herself with institutional strategies, digital resources and any articles, presentations and blogs written by the participant. Most interviews were conducted online using the video conferencing platform Zoom. The project interviews commenced eighteen months after the start of the Covid-19 pandemic, by which point all participants had acquired extensive experience of online meetings and video conferencing platforms. They appeared comfortable meeting online, agreed to interviews being recorded and took advantage of the chat function to

share documentation and internet links. Video made non-verbal cues visible, aiding rapport-building.[25] The author appreciated the freedom to interview participants who could offer rich data, regardless of their geographical location (Braun and Clarke, 2013, pp. 98–101; Pickard, 2013, p. 201; Archibald *et al.*, 2019). In-person meetings were conducted with five University of Glasgow participants. After nearly two years of almost exclusively digital engagement with the research and cultural heritage communities, it was refreshing to converse with people face-to-face. Nevertheless, between digital and in-person, there was little difference in the richness of the data generated. One disadvantage of online interviews was the lack of opportunity to see the working environment and activities 'in action'. Fortunately, the author had had a tour of NLS' digitisation suite during scoping in 2019, and was able to visit Sunny Bank Mills and UofG's Photographic Unit.

Document analysis

The author used institutional documentation to inform the interview questions and analyse and amplify case data. To gain insights into each institution's aims, actions and public messaging and develop pertinent questions for each case, the author studied the institution's website and other public engagement tools, such as its in-house magazine and social media channels; read policy documents and annual reports; explored the online catalogue (where one existed), collection guides and any digital resources; and reviewed any relevant publications (co-)authored by case participants. Analysis of this documentation was also used to amplify, clarify and interpret the data collected from the institutional and digital access case interviews and meetings. The documentation provided an alternative perspective on organisational strategy, priorities, budgets and activities, plus background data on figures and programmes mentioned by the participants (Pickard, 2013, p. 102). The author recognised that formal and informal communications present a curated narrative, written to convey specific messages to defined audiences (Shenton, 2013, p. 252; Yin, 2018, p. 116). These messages were compared with the participants' perspectives on policy and practice. The author realised that strategies published shortly before the Covid-19 pandemic might have been derailed, or no longer aligned with the institution's post-pandemic priorities, and asked participants about this. During the analysis phase, the author checked to see whether case organisations had published revised strategic plans.

[25] One participant had to turn off her video temporarily during the interview, due to an unstable connection; the loss of the non-verbal cues did impact the fluidity of the conversation.

Survey

Ideally, archive discovery tools should be appropriate for the records involved and accommodate the questions audiences want to ask (Prescott and Hughes, 2018). Portals like Parker on the Web,[26] designed to provide access to medieval manuscript codices for academic researchers, can tailor their tools accordingly but, for most repositories holding textile collections, access provision is more complicated, as these collections are one class among many. For example, ASC's textile company collections exist alongside records on shipbuilding, theatre, University governance and genetics, to name but a few. The service publishes collections data on the UofG platform it shares with the Hunterian Museum and also on Archives Hub,[27] so a 'one size fits all' approach is necessary. Its audiences' requirements are diverse. A conservator researching the light fastness of 1870s dyes will ask different questions of digital platforms to an economic historian examining company cash flows. But a subset of metadata and search features will be relevant to multiple audiences, so it is worthwhile for services to identify what those features might be. However, the author's review of literature on textile heritage research revealed that limited research has been published on researchers' experience of locating pattern books in archives and the extent to which catalogue descriptions and digital resources facilitated, or hampered, that discovery process. Nor has much been written about researchers' views on the usefulness of digital images of pattern books published online by archive services. Consequently, archive services seeking to enhance access to pattern books lack data about users' requirements and experiences to guide their improvements.

The author decided to address that gap by formulating a descriptive survey to gather views from textile heritage users about their experiences of searching archive catalogues and other resources. The survey aimed to gain insights into what topics researchers were investigating through textile archives and textiles; learn what strategies researchers employed to track down these sources and assess their relevance; ascertain whether that discovery process was generally straightforward or frustrating; and understand researchers' use of digital images of records in their research. Originally, the author intended to use the survey data to inform a wider discussion of users' perspectives on digital access to archives, but the project evolved to concentrate on the practitioner task of digital provision. Nevertheless, the survey's snapshot of user views, albeit limited, and especially the individual comments contributors expressed, provided useful insights into some textile

[26] https://parker.stanford.edu/parker/ (accessed 18 Aug 2024).
[27] An aggregator for archive collections data, https://archiveshub.jisc.ac.uk/.

heritage users' aspirations and frustrations regarding digital access, and these views were incorporated into the discussion on digital access in chapter 6. A qualitative perspective for the survey was adopted for several reasons. Textile heritage user communities are diverse and hard to quantify[28] and it would be difficult to use probability sampling methods to ensure that responses were fully representative (Bryman, 2012). As the survey was just one strand of a doctoral research project, the author did not have time and resources to actively solicit contributions, e.g. by contacting tutors leading further/higher education textile courses. Acknowledging that responses were likely to be low, and that it would not be meaningful to quantify the results, the author viewed the survey as an exploratory glimpse into researchers' discovery and usage practices and did not plan to generalise the findings (Tanner, 2013). She decided upon an online, self-administered, anonymous questionnaire as the survey instrument. This would not geographically restrict the research community being surveyed, it could be administered at minimal cost, automatic data capture would avoid transcription errors, and the software (Microsoft Forms) facilitated data analysis (Braun and Clarke, 2013, pp. 135–136; Tanner, 2013). No identifying information about respondents would be collected, offering them space to express their views without anxiety about comeback (Tanner, 2013).

The questionnaire was developed from the literature on textile heritage research and archival user studies, and from conversations with archivists and researchers (the questions are listed in Appendix One). To learn how pattern books are used in research, the author examined literature reporting on researchers' investigations into manufacturing and product development (for example, Tuckett and Nenadic's study of Turkey red manufacturing (2012)) and scientific analysis of samples (e.g. Alcántara-García and Nix, 2018), as well as accounts by creative practitioners and educators of their use of pattern books for inspiration and learning (e.g. Claypool, 2020; Hackney *et al.*, 2020). To understand what is already known about archive users' search strategies more generally, she reviewed literature reporting on studies into researchers' experiences of searching for, and using, archives online, such as Anderson (2004), Warwick *et al.* (2008) and Eden, Jirotka and Meyer (2012). She discussed textile research and heritage science with an academic historian at the University of Glasgow and her supervisor Quye, a heritage scientist, and asked UofG Archives and Collections staff about their efforts to describe textile designs and colours. Practical advice about formulating questions and questionnaire

[28] They span academics, students, cultural heritage professionals, those working in textile/fashion industries, creative practitioners and enthusiasts.

layout was taken from the methodological literature, for example, Peterson (2000), Tanner (2013) and Braun and Clarke (2013). The questionnaire was reviewed by Quye and the historian to ensure that the questions and response options were appropriate to the field, and sense-checked by two people with no background in the research area. These reviewers also piloted the online questionnaire and provided feedback on usability (Peterson, 2000). Pickard cautions against the use of open-ended questions, because they require too much time and thought. Specifically, she points out that an invitation to add anything else at the end of a questionnaire 'usually […] comes back blank!' (2013, p. 196). In the face of this warning, an 'anything else' invitation was included, and one-third of respondents used it to offer valuable observations. The survey was advertised on e-mail discussion forums suggested by the reviewers as sites frequented by textile heritage communities, namely Jisc archives-nra, the Global Conservation Forum, Dress and Textile Specialist Network, and The Textile Society.[29] To address coverage bias (Tanner, 2013) and reach people who do not subscribe to the forums, the author arranged for an advert to be published in the Dress and Textile Specialist Network Spring 2022 newsletter[30] and wrote an article for The Textile Society's newsletter. She recognised that, as all these channels are digital, researchers who do not use the internet would be excluded but, as the survey investigated digital practices, digital users were the target audience. The questions assumed respondents were familiar with online catalogues and resources (Peterson, 2000, pp. 8–9).

Data analysis

The aim of the institutional case studies was to learn about the factors influencing each institution's approach to description, digitisation, access and materiality. It would be meaningless to compare the Natural History Museum with Sunny Bank Mills and make generalisations; instead, the intention was produce rich descriptions so that readers could evaluate whether the findings would transfer to their context (Stake, 1995; Pickard, 2013, p. 109). Data analysis was informed by Braun and Clarke's reflexive thematic analysis process of data familiarisation, systematic coding, initial identification of themes, review

[29] Posts published on Jisc's archives-nra listserve are mainly from UK and Irish archive sector professionals and students. The Global Conservation Forum, run by the American Institute for Conservation and Foundation for Advancement in Conservation, attracts an international community. The Dress and Textile Specialists is an information-sharing network for UK and Irish professionals working with fashion, dress, clothing and textile collections. The Textile Society promotes the study of the history, culture and design of historic and contemporary textiles and connects with students, researchers and practitioners.

[30] Unfortunately, the editor forgot to include the notice.

and fine tuning (Braun and Clarke, 2022). The process of transcribing the interview recordings allowed the author to immerse herself in the data, identify topics and become aware of nuances in participants' responses. The first couple of interview recordings were transcribed manually; the remainder were transcribed using Word's transcription tool, then checked against the audio. For the interviews which were not recorded, the author typed up her notes. She used data analysis software Nvivo, available through the University, to code and help analyse the data. First, for each interview, she created concise labels (codes) and applied them to elements which were potentially meaningful for the research, e.g. 'short-term budget cycles hinder planning'. Once a few interviews had been coded, themes started to emerge and she grouped codes into these themes. Some themes were anticipated, reflecting the subjects under investigation, such as 'cataloguing and metadata' and 'materiality'. Other themes spoke of participants' specific contexts, for example, 'collaborative working', 'finance' and 'staff and staffing'. As more data was coded, the themes were reviewed, refined and added to where necessary. For example, 'digitisation' was initially categorised as one theme. As coding proceeded, it became clear that this did not capture the gamut of planning and practice issues discussed by the participants. The author therefore created three themes: 'digitisation approaches and choices', which included reasons for digitising X document (e.g. conservation concerns) and decisions whether or not to capture material properties; 'digitisation workflow and process', which covered preparatory actions and technical decisions relating to capture and post-processing; and 'digitisation challenges', comprising issues such as copyright, document format, and prioritisation. Table 5 lists the set of codes under digitisation challenges.

Before the data for each case was analysed, the author re-read the transcripts, reviewed the codes, clarified them if necessary and re-assessed their place in the groupings. Similar codes were compared and either merged or differentiated more clearly. The codes and themes enabled the author to identify and analyse the key topics which had emerged for each case institution (Creswell, 2013; Braun and Clarke, 2022). As the author analysed the data and wrote up each case, she worked inductively from the raw data, returning repeatedly to the transcripts to check nuances of meaning (Patton, 2015, p. 66). There was no attempt to harmonise participants' contributions and create one institutional voice. Instead, the diversity of opinions was respected (Williamson, Given and Scifleet, 2013). She triangulated her case description and analysis with data from the document analysis, which enhanced her understanding of how specific activities or projects were delivered and

allowed her to compare institutions' public messaging with participants' accounts of their working context.

Theme: Digitisation challenges
Codes
Collection diversity slows down digitisation workflow
Constraint - need specialist equipment to digitise large items
Copy service digitisation means just few pages of item imaged
Copyright/IP barrier to digitisation
Difficult to digitise large or complex items
Digitisation: hidden cost of staff input to make it happen
Digitisation: need to prioritise and be selective
Digitisation: pressure to maintain capture rate
Digitisation: textile colours difficult to capture accurately
Digitisation: what's possible may be compromise on quality
Digitisation cannot do justice to pattern books
Digitisation cannot do justice to textiles
Digitisation divorces objects from their archival context
Massive challenge to digitise UK specimen collections due to scale

Table 5. Coding for digitisation challenges

Data analysis for the two digital access cases drew on meeting notes, documents and analysis of online resources. For the Glasgow School of Art case, the author analysed her notes from the online meeting with Waters and Kaye, her site visit to the GSA Archives and a presentation given by Kaye on developing GSA's catalogue. She spent time examining and running searches on the Archives' online catalogue and website. Archives' department blogposts and institutional documentation provided background, timelines and data from another perspective. The analysis sought to understand how aims and objectives for material-centred access had been translated into practice. Outcomes were contextualised by the staff's account of the choices they had had to make, given their resources, and what they considered good enough. A similar approach was used for the Chatsworth Archives case, which also drew on data from meeting notes, formal and informal documents, and the author's study of Chatsworth's catalogue descriptions and online resources on the estate's website and Archives Hub.

Microsoft Forms provided the raw survey data in .csv format, enabling it to be analysed using Excel. Excel tools were used to count responses and generate graphical representations (bar and pie charts) of the data, which illustrated the trend of the responses (Pickard, 2013, p. 96). The small number of responses, use of non-probability sampling and descriptive design made statistical analysis inappropriate. Also, as the respondents were not asked in what capacity they were undertaking textile heritage research, e.g. as an academic researcher, curator or student, generalising to the sample was not possible, as the population represented was not known (Bryman, 2012; Tanner, 2013). Nevertheless, insights in users' search strategies and research topics and respondents' willingness to contribute thoughtful responses in the free-text comments fields in the questionnaire made the survey a useful introductory, exploratory study of researchers' experiences of textile heritage research.

Effective, not 'best' practice

This project shares 'effective practice' (Patton, 2015, p. 191), not 'best practice', for material-rich digital access to textile heritage collections. Patton points out how ubiquitous, yet undefined, the concept of best practice is and underlines that '"best" is inevitably a matter of perspective and criteria [… because] in a world that manifests vast diversity, many paths exist for reaching a desired destination' (2015, p. 191). What works is embedded in context and, regardless of one method's success in one context, it may not transfer effectively to a different context. Coffield and Edward (2009) draw attention to the need to define how good practice or best practice are assessed and highlight that, too often, the terms 'good practice' and 'best practice' are 'apparently interchangeable and unproblematical […] but somehow their meaning is considered to be widely understood and agreed'. They concur with Patton that the inference of best practice can be unhelpful, implying 'that there is only one approach which, if used, will solve any difficulties' (Coffield and Edward, 2009, pp. 374–375). Kate Theimer rejected 'best practice' for her series of books for the archives sector because, she explained, 'in a field that seems to embrace the phrase "it depends" as a mantra, putting forward the experience of any one archive as best practice seemed ill advised.' (2014, p. viii). UK archive services have different aims, functions and types of collections. A one size fits all approach for digital access will not work (Prescott and Hughes, 2018). Notably, in 2018, the Digital Preservation Coalition (DPC) appointed a Head of Good Practice and Standards to support the development of *good* practice in digital preservation, not *best* practice (Digital Preservation Coalition, 2018). Following the DPC's example, this project presents

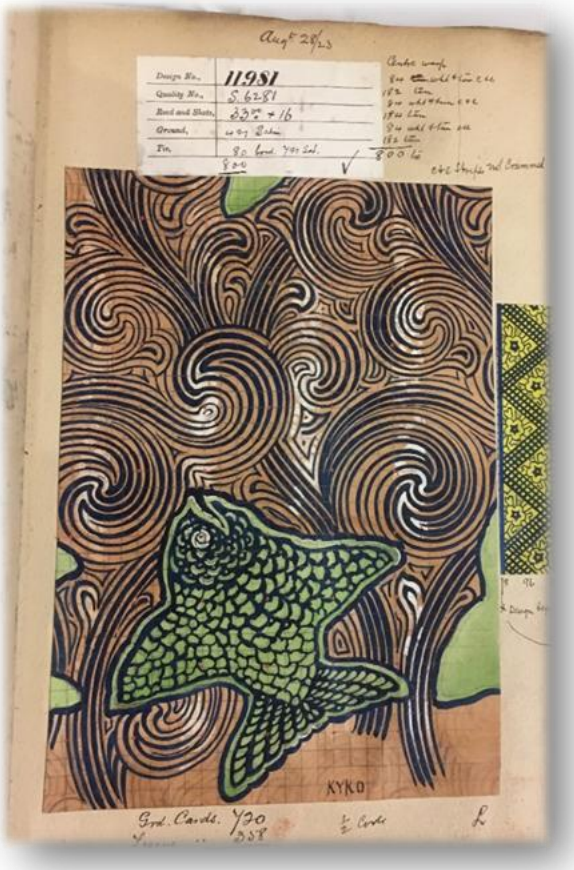
examples of practice which, in the subjective opinion of the author, effectively communicate material aspects digitally. The criteria she applies to form that judgement are specified. Patton (2015, p. 193) advises that offering ideas as better or effective practices allows for discussion and consideration of other points of view. By sharing multiple approaches, the author hopes to prompt discussion about materiality and digital access and enable practitioners to weigh up what might work effectively in their context.

Ethical considerations

Research ethics have been carefully observed to ensure that participants and their data have been treated ethically and in line with GDPR and University guidance. Ethics approval was granted by the University of Glasgow's Ethics committee in September 2021 (application reference 100210005, see Appendix Three for a copy of the Ethics application form). Project planning included the production of participant information sheets and consent forms, risk assessments and a data management plan. Each institutional case participant received a copy of the participant information sheet and consent form prior to their interview. The consent form provided information about how the participant's data would be managed and used and allowed them to specify how they wanted to be identified in the thesis (by name and role; by role only; generic descriptor). It made clear that, as each case study related to a named institution, their affiliation to that institution could not be anonymised. Interviews were recorded where participants gave their explicit consent; transcripts were forwarded to participants to review. During the project, the author met with other GLAM professionals to learn about activities they were involved in. She explicitly sought their consent to use their data in the thesis, offering the same identification options as above. Survey participants were presented with project information at the beginning of the questionnaire and were required to tick two boxes to confirm consent to the use of their data before they could proceed to the questions. No identifying data was collected from these participants. The questionnaire was administered using the University's instance of Microsoft Forms, which it approved for research, as the data is held locally on University servers. Consent forms, recordings, transcriptions and the author's interview notes are stored on the University's password-protected cloud storage solution OneDrive, which uses servers managed and backed up by the University. The data is also backed up on a password-protected hard drive, which is stored securely at the researcher's residence. Each participant has been identified by a code and this is used to label files and manage data. At the end of the project, a subset of project data will be

made accessible through the University's research data repository for a period of ten years, in accordance with University guidelines.

Reading



This swirling fish design, intended for silk fabric, was painted on graph paper to show how the pattern would be set up in the loom. KYKO may be the designer's initials. Comparison with other designs in the volume indicates that the red spots are manufacturing instructions, not part of the design. The handwritten notes describe the loom settings. The reference to cards indicates that the firm used jacquard looms, which were controlled by punch cards, similar to early computers: this pattern requires 1078 cards. The design is dated 28 August 1923, either the date the pattern was finalised or the date it was put into production.

Figure 10. Paper pattern for silk fabric, Caldwell, Young & Co., 1923 (private collection)

Chapter 3 Perceptions of materiality

Archives are not ethereal carriers of textual and visual content. They are three-dimensional artefacts whose materials, form, texture and smell embed valuable information about their creation, creators and use over time. Understanding a document's material context can be vital to interpreting the informational content (Wiggins, 2023a), be it a twentieth-century business letter or medieval lease. Digital Humanities scholar Bill Endres observed, 'quality of parchment, types of pigments, wear from use, and markings from travels, all make manuscripts instructive witnesses to the medieval world and beyond.' (2019, p. 2). The form of a printed book 'says things through its physical expression, such as how the text is laid out on the page […], what typefaces are used, how it's bound, and what the paper is like that it's printed on.' (Werner, 2019, p. 102). Material qualities do not only communicate information. Peter Lester describes archives as 'objects, with tangible, physical qualities which can elicit and stimulate both cognitive and sensory responses.' (2018, p. 74).

Material features of rare books and manuscripts are studied in librarianship and manuscript studies, but a similar approach to archives is not evident within archival theory, methodology and practice. Nor, traditionally, have archive users engaged deeply with their sources' physicality. But now, researchers and archivists are discussing the material nature of records. This chapter explores archivists' relationship with records as artefacts, considers why theory has privileged context and discusses its impact on descriptive practices. It examines records' material qualities to demonstrate the value of the evidence they bear about their creation, creator, function and career. It concludes by considering material relationships between records and how engaging with records as artefacts fosters connections between present audiences and past users.

Perspectives on materiality

Librarians have a long history of describing the physical features of manuscripts in catalogues, often in extensive detail (Da Rold, 2017), with entries potentially covering the materials, dimensions, collation, binding, layout, decoration, evidence of ownership, annotations and signs of wear. An early example is the British Museum's *Catalogue of additions to the manuscripts, 1846-1847*, which described salient features of manuscripts, despite the limited space. Taking a German religious commentary written in 1459 (accession 15,712), the cataloguer recorded the medium, size, appearance of its wood

engravings and how they were inserted, and transcribed a provenance annotation (The Trustees of the British Museum, 1864, p. 14).[31] During the nineteenth and twentieth centuries, many librarians and scholars published detailed catalogues similar to the catalogue compiled for the University of Glasgow's Hunterian Museum Library (Young and Aitken, 1908), which provides an extensive account of each manuscript's form, materials, appearance and evidence of use. These printed catalogues underpin modern institutional online catalogues, such as Parker on the Web and the Bodleian Libraries' catalogue of Western manuscripts.[32] The material properties of early printed books have also received close attention. In the mid-twentieth century, bibliographers like Greg and Bowers produced handbooks to standardise descriptive practices for scholarly purposes while, in 2017, University of Glasgow librarians completed a nine-year project to produce comprehensive, material-rich descriptions of their 1,062 pre-1500 printed books (Baldwin, 2020).

Of course, not every book and manuscript in every library has been catalogued to this level of detail. But increasing researcher interest in the material qualities of books and manuscripts is encouraging librarians to enrich basic descriptions where possible. Since the 1990s, growing engagement with material culture theories has permeated many Humanities disciplines. As Tilley explains, the study of material culture encompasses a broad range of perspectives, examples of which include studying objects (artefacts) created by people (as distinct from objects which exist independently, like stones), the materials or technologies used to form them, their exchange and movement, or their relationship to tradition or collective memories (2006, p. 4). Some scholars focus on the relationships between people and objects, examining how human relationships are shaped by objects' material properties, the symbolic functions objects had and the signifying properties they contained, or their ability to shape social interactions (Nelson and Terras, 2012). Others place the objects centre-stage and examine their life histories, or 'object biography', a concept introduced by anthropologist Igor Kopytoff (2013, pp. 66–67). Kopytoff proposed that questions asked to formulate human biographies could be applied to objects, such as where the object is from, the functions it has served and how these changed during its career, and what happens when it is no longer useful. Biographies which include insights into relationships between objects and people formulate these from the objects' perspective as active agents (Joy, 2009). Curators Kirsten Wehner and Martha Sear (2010) used the

[31] It is noticeable that archival items listed in this catalogue were not described physically.
[32] https://medieval.bodleian.ox.ac.uk/ (accessed 12 Sep 2024).

biographies of individual objects in the National Museum of Australia's collections, including a gold-washing cradle and 1929 film camera used in Antarctica, to create *Australian Journeys*, an exhibition about transnational place-making. The exhibition's design encouraged visitors to study the objects' form and materials and reflect on how their material qualities shaped the ways in which individuals interacted with them. In manuscript studies, scholars informed by material culture studies' engagement with cultural objects are paying increasing attention to manuscripts and books as cultural artefacts. They scrutinise their materials; consider the interplay between form and user interaction; examine practices associated with reading, personalising and sharing textual objects; and investigate cultural contexts of production and circulation (Da Rold, 2011; Nelson and Terras, 2012). Their research is facilitated by the material-rich descriptions in library catalogues, and digital views of physical elements, where they exist.

The situation is different in the archive sector. There is no established practice of documenting material properties comparable with manuscripts librarianship. Explicit theoretical discourse about material concepts is lacking (Sundqvist, 2021). Theory, methodology and practice have grown up round the analysis and description of context and provenance for administrative records, usually at fonds or series level (Echard and Prescott, 2020, p. 240). The standard hierarchical finding aid (inventory), in which that context is described, was intended originally for internal collections management and retrieval, not user access, and especially not unsupported remote access. Its evolution is examined below. But as collections have diversified, questions of whether and how to document materiality have surfaced. Papers from writers, musicians, architects, engineers and textile designers document creative processes, and the physical composition of the collection, and its components, embed information about those processes (Breakell, 2023). Researchers are asking material-orientated questions of archives and this, coupled with digitisation, the growth in born-digital records and the wider intellectual discourse about material culture, is fostering discussion about materiality's place in archival theory and practice (Lester, 2018; Breakell and Russell, 2023).

Researcher interest in the artefactual nature of records is not new but it has waxed and waned over time. In the Renaissance era, document collectors were more interested in records' physical features than their content. Antiquarians studied cultural objects to test existing historical accounts and create new knowledge. Academic historians from the nineteenth century onwards have primarily immersed themselves in records' contents and have had little to say about form or materials (Lester, 2018; Buchanan, 2023). The

scholars may acknowledge that the experience of handling the records deepens their connection with, and offers insights into, their subject, but their research and writing focus on their analysis of the textual content (Robinson, 2010). Even among those historians who study medieval legal, administrative and personal records, only a small subset have emulated manuscript scholars' engagement with their sources' form and physical compilation (Prescott, 2008). Maryanne Dever has chided fellow Humanities scholars for being oblivious to what texts are written on and treating this base as a neutral carrier with no bearing on interpretation (Dever, 2013). But increasingly, there are examples of researchers writing and theorising about the physical form, appearance and organisation of the records they study. In the *Prize Papers* project, historians are researching, describing and digitally documenting physical aspects of ships' logs, court papers and intricately folded correspondence, and the material relationships between records.[33] Literary scholars tease out the evolution of a text and the writer's creative process through close study of the writer's papers and the physical evidence they hold of rewriting, rearrangement and emendation (Sutherland, 2022, pp. 1–9). As poet Emily Dickinson did not publish any of her poetry, researchers scrutinise her handwritten texts to discern how she set out her poems and debate the extent to which her choice of spacing and syntax was purposefully chosen and intended as a full realisation of a poem's form, rather than as a pre-publication draft (Prescott, 2008; Harvard University, no date). Alison Wiggins' study of Bess of Hardwick's correspondence documents the ribbons, slits and seals used to secure sixteenth-century letters and discusses the significance of her correspondents' choice of paper size, ribbon colour or folding method (Wiggins *et al.*, 2013). The emerging field of archival history, otherwise archaeological archivology, involves studying how documents were created, treated once designated as worthy of long-term preservation, and subsequently accessed. Researchers examine the physical evidence for changes in documents' structure, how they were collated, the relationships between documents, where and how they were stored, and who had access to them (Horsman, 1999; Buchanan, 2023). Archives are attracting a growing number of creatives who respond to the physical qualities of records through creative writing, artworks and textiles. Designer Helena Britt produced textiles inspired by 'the lines, the patterns, the precision and order' on Gillespie, Kidd & Coia architectural drawings (Bremner and Britt, 2009, p. 61). Artist Kelly Rae Burns responded to the archiving aesthetic, the 'organisation and colour combined with the element of history', observing that 'the wear/tear and variation of materials used throughout time are delicate and exquisite' (Burns, 2014). But for those users who are interested in

[33] www.prizepapers.de (accessed 18 Aug 2024).

investigating records' physical qualities, context-centred archival descriptive theory and practices are not well-placed to support user discovery and interpretation of records' material features (Magee and Waters, 2011).

Content, context and structure

Western European and North American archival theory identifies content, context and structure as the three core, inter-related, components of a record. Content is the information preserved in or on the record object; context the circumstances surrounding its creation and use; and structure the record's physical attributes and intellectual form (Millar, 2017, pp. 12–13; Society of American Archivists, 2023).[34] So in calico printer Patrick Mitchell's 1808 day book (Figure 11), the printing instructions and fabric patterns form the content. The dates and place name 'Anderston' locate it within Mitchell's period of employment as General Manager at printer William Gillespie & Sons, providing context. Structurally, it takes the form of a pocket-sized notebook, something to keep at hand in the workshop. Annotations and comments are squashed into the margins, suggesting that Mitchell moved forwards and backwards through the notebook, updating notes as he acquired additional information. Read together, the content, context and structure illuminate how Mitchell approached and documented his work and help researchers to assess the authenticity of the document. A mismatch between these three components alerts the researcher that the document may not be all it purports to be. A very obvious example would be a black and white, 1980s photocopy of Mitchell's notebook, where it would be evident that the bright white, wood pulp paper did not correspond to the 1808 dates in the text and that the pages were modern copies.

[34] Other theorists discussing this include L. Duranti (1998) and C. Williams (2006a).

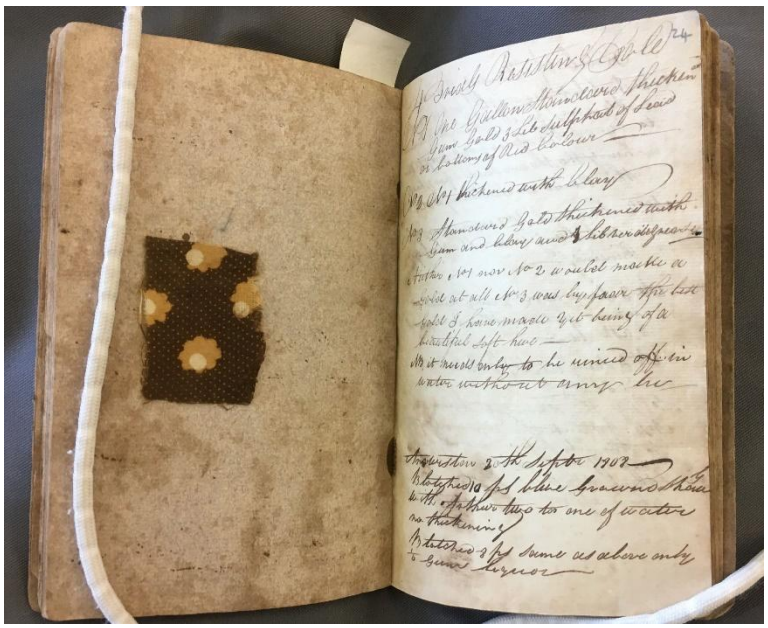


Figure 11. Patrick Mitchell's day book, William Gillespie & Sons, 1808 (NLS MS.17966)

Although archival theory designates physical structure as a core component of a record, the nature of the evolution of the profession has led description to prioritise provenance and functional context. In the medieval period, local and national governing bodies in Europe generated large quantities of administrative records. Clerks were appointed to manage them; they compiled inventories to show what records existed and aid retrieval, primarily for internal users (Duchein, 1992; Duranti, 1993).[35] Medieval recordkeeping practices continued largely unchanged into the eighteenth century, despite the impracticality of formats like Pipe Rolls, where pages were stitched into long rolls, and tally sticks. Clerks were familiar with records' form and how their information was organised, so inventories did not need to describe this. Difficulties in locating content within records to answer internal enquiries prompted the creation of additional, content-based guides; for example, in the thirteenth century, the English Treasury started to compile calendars. Then, in response to increasing numbers of external reader visits from the sixteenth century onwards, often pursuing antiquarian and genealogical enquiries, government recordkeepers compiled departmental guides, catalogues and subject lists (Hallam, 1990). Archive administration emerged as a discipline in Europe in the nineteenth century. Training programmes were introduced, the concepts of *respect des fonds* and original order were defined, and manuals written by government archivists codified theory into procedures

[35] Maintaining archives of textual records has a much longer history, but pre-Medieval practices had limited impact on subsequent recordkeeping. Similarly, religious houses and secular landowners maintained archives but their approaches did not shape archival theory.

(Duchein, 1992).[36] For Muller, Feith and Fruin, the authors of the Dutch *Manual* (1898), an inventory explained the administrative context which had produced the records and provided an overview of the collection (Ketelaar, 1996). They believed item-listing confused rather than clarified what the collection contained: indexes and calendars could provide more detail, if necessary (Muller, Feith and Fruin, 2003, pp. 100–108). British archivist Hilary Jenkinson concurred, although he did encourage archivists to create fuller listings, if they had time, observing, 'it is surprising how useful a Descriptive List even of a series of large Rolls or Registers may be'. In these lists, Jenkinson deemed reference, document type, date and size essential. Subject, personal and place names were desirable; material, form, language and seals only occasionally required (Jenkinson, 1937, pp. 115–132). Theodore Schellenberg stated that American inventories, which took the series as their unit of description, should convey records' functional context, coverage, document type and arrangement. He did not see much need for detailed lists; if compiled, the usual approach was by subject (Schellenberg, 1996, pp. 208–213). These influential theories and methodologies were rooted in the management of textual governmental records, were conceived by practitioners working in that domain and intended to advise other archivists working in the same domain (Cook, 1997; Schwartz, 2002). They took no account of personal, literary or business records, nor visual material such as photographs, maps and textiles; indeed, the authors of the Dutch *Manual* consigned private and personal archives to the domain of libraries and librarians (Cook, 1997, p. 21). Although modern scholars and archivists routinely challenge and critique these older theories, their priorities and perspectives continue to pervade archive administration theory, practice and training (Sexton, 2023).

Meanwhile, from the 1990s onwards, archival scholars have drawn on postmodernist worldviews to reframe the role of archivists, drawing attention to their subjective, participatory creation of societal memory through their appraisal and selection of records. They advocate for description which captures the complex relationships and contexts of collections and the multiplicity of voices within them, ideally through co-equal, participatory cataloguing involving communities represented in the records. Cook envisages description which is context-driven, fluid and ever-changing and which, by capturing contextual nuances, surfaces extensive content information without comprehensive item-level description. Yeo favours description which is relational, to

[36] The principle of provenance (*respect des fonds*) was defined by French archivist and historian Natalis de Wailly in 1841. Around 1880, German archivists in the Royal Archives of Prussia defined the principle of *Strukturprinzip*, respect for original order (Duchein, 1992, p. 19).

represent records' many-to-many relationships (modelling them with linked data or visualisation tools), and ideally item-level, although he recognises the practical challenges in achieving this (Cook, 2001b; Nesmith, 2002; Yeo, 2017). Postmodern scholars' thought-provoking discussions have a great deal to say about appraisal, description, contexts, transparency and power, but contain few observations about the physical structure of records, the material evidence that structure holds and the value in documenting that evidence. Yet archivists are not oblivious to the physical nature of archives. They are profoundly aware of records' physicality, tactility and visual appearance, and are skilled at reading and interpreting those elements as part of their professional management of collections. However, these skills and awareness are usually unacknowledged in the professional literature and discourse.

Material awareness

While documenting material evidence may have been overlooked in archival theory, practical concerns about storage, preservation and access have long appeared in professional discourse. Physicality is often framed as a challenge, as staff struggle to shelve large rolled plans, provide access to glass negatives or address backlogs of unprocessed records.[37] Seventeenth-century Deputy Chamberlain of the Exchequer Arthur Agarde stipulated that clerks should protect records against fire, water, mice and especially misplacement, 'the bringer of all horror and inconvenience' (Yax, 1998, pp. 64–65). Twenty-first century archivists are attentive to the physical care of the records in their custody. They manage the environmental conditions in their strongrooms and, where possible, package records in acid-free boxes and folders to protect and preserve them. They have processes for controlling the movement of records to guard against misplacement. They willingly publish articles on their plans for new strongrooms or repositories, their use of barcodes for stock control and strategies to balance environmental control with cost-saving and climate concerns.[38] Shelf-loads of uncatalogued records provoke archival concern. Faced with the *De Banco* and *Coram Rege* plea rolls, V.H. Galbraith, an assistant keeper with the Public Record Office in the 1920s, declared that 'their overwhelming bulk is almost frightening' (1948, p. 2).[39] Archivists working in post-

[37] My thanks to Andrew Prescott for this observation.

[38] See, for example, Akeroyd, A. (2010) 'The Barcode Revolution', *Journal of the Society of Archivists,* 31(1), pp.51–62, and Walker, W. (2011) 'The Keep: Developing archive services in partnership', *ARC Magazine*, 259, pp.21-24. The ARA 2024 annual conference is devoted to climate change, with one track focusing on passive and sustainable storage.

[39] De Banco were used in the Court of Common Pleas, Coram Rege in the Court of the King's Bench.

war Britain rescued immense quantities of records from abandoned estates and collapsing industries, including textile manufacturing, but they and their successors have struggled to process them (Moss, 1990; Sykas, 2001). Professional concerns about burdensome shelves of unprocessed records have driven appraisal theory. Jenkinson (1937) was acutely aware of the difficulties in appraising the vast quantity of administrative records generated as a consequence of the First World War, increasingly complex administrative structures and the growth of duplication technologies, although he had no solution. In the USA, Norton, Brooks and Schellenberg formulated their appraisal theories as a response to a similar situation at the National Archives (Cook, 1997, pp. 24–27). Greene and Meissner's 'Less Process, More Product' method (2005) was similarly devised to address ongoing processing backlogs.[40] More recently, archivists' daily engagement with the physical reality of archives has provoked a degree of frustration with postmodern theorisations of 'the archive' as an intellectual concept which bears little resemblance to archivists' lived experience (Caswell, 2021).

A less overtly acknowledged aspect of archivists' physical engagement with archives is what Buchanan (2023) refers to as archivists' 'craft knowledge', that is, knowledge that is increased, and its values demonstrated, through practice, rather than writing. Through training and practical experience, archivists learn to 'read' the physical evidence of records' past functions and curation, recognise structure and form, evaluate condition and assess how these physical elements will impact collections' management and potential use (Breakell, 2010; Buchanan, 2023). Buchanan puts forward several reasons why she believes that this practice-based knowledge is not accorded professional recognition. First, within the profession, while practical learning is incorporated into current UK Masters programmes in archive administration, Buchanan points out that the bodies which accredit these courses do not stipulate what this craft learning should cover, because it is hard to convey through standardised definitions.[41] Looking at the course websites, the practical training does not appear to be treated as a core module, equal to the theory courses. Next, Buchanan proposes that archival scholarship prioritises intellectual analyses of appraisal, power, identity and memory and has diminished consideration of human-artefact relationships and records as physical entities. Consequently, archivists who desire to be

[40] Greene, M. and Meissner, D. (2005) 'More product, less process: revamping traditional archival processing', *The American Archivist*, 68(2), pp. 208-263.

[41] University College London and the Universities of Glasgow, Dundee and Aberystwyth require applicants to have pre-course experience; the University of Liverpool does not. All but Dundee include a compulsory practical placement. Dundee requires all students to work or volunteer in a professional records setting throughout their studies.

taken seriously by the academy publish on these theoretical topics, rather than writing about the craft of archive administration.[42] Third, Buchanan states that contemporary archival studies only engages with selected elements of past archival literature which directly relate to its current concerns, overlooking writers and writings which do not cover topics of interest. An example of this is the Summer 2022 issue of *Archives and Records,* whose theme was 'Challenging the canon', prompted by the centenary of the publication of Jenkinson's *Manual*. Six of the seven articles discussed Jenkinson's views on appraisal, neutrality and authenticity, recurring themes in current archival studies.[43] None explored his stance on, say, preserving folders bearing evidence of past curation or standardising terminology to support research, although these subjects feed into concerns about transparency and access in contemporary practice.

While the academy may not write about craft knowledge, examples of archivists' practice show their sensitivity to the material qualities of records. This project's case study participant from Southwark Archives enthused about the material features of old posters. She observed how the choice of paper and typeface, size and appearance and production methods revealed so much about printing processes, social history and the explicit and implicit messages the posters communicate (Southwark staff member, 2022). Bolton Museum and West Yorkshire Archives invited textile students to engage creatively with letters, maps and pattern books (Carter, 2016; Claypool, 2020). Sunny Bank Mills chose 360-degree imaging as its digitisation method because the curator wanted to offer viewers a deep dive into the materiality of the objects (Moaby, 2022). The author also wanted to encourage informal conversations about materiality among those who work with archives. She organised a workshop for GLAM professionals, combining presentations on material-centred work being undertaken by archivists, librarians and researchers with a hands-on session exploring and discussing the physical features of selected documents. Michelle Kaye described the GSA's work to enable its creative practitioners to search and browse the catalogue by physical attribute (see case study in chapter 6). Clare Paterson and Robert MacLean of ASC discussed their use of live streaming and filming for teaching and how the technology allows them to focus on letterpress indents, watermarks, texture and other

[42] To informally test this statement, the author reviewed the topics of all the articles published in *Archives and Records*, the journal of the Archives and Records Association, from Spring 2021-Spring 2024, fifty-three articles in all. She read each article abstract and conclusion and, if necessary, section headings or selected paragraphs to establish the topic and how it was addressed. None explicitly discussed archival craft knowledge. The author also examined six editions (Sep 2023-Aug 2024) of *ARC Magazine*, ARA's bi-monthly members' magazine. Only one article, an interview with a new ARA Board member, mentioned the craft of archival work.

[43] The other article discussed Sweden's Performing Arts canon.

elements which would be hard for a group clustered round the table to see (see chapter 5). Academic Alison Wiggins demonstrated how reading and interpreting material evidence was critical to understanding the function and career of the archives she studied. In the practical session, the participants held animated conversations about the layout and size of lettering on theatre posters, Gothic font in a book dating from 1486, the confusing medley of items in Edwin Morgan's scrapbook and the impressive wax seal of Elizabeth I on a letters patent dated 1589. It was evident that practitioners were keen to engage with records as tangible artefacts and were alert to their material riches and evidence.

Despite the lack of professional recognition for materiality's role in practice, some archivists have publicly championed the important function of materiality in interpreting archives. Galbraith was attuned to the evidential value of records' physical form, and especially the relationship between form and function. In his view, to understand how records functioned within medieval society, archivists needed to be aware of their form, appearance and intellectual organisation (1948, pp. 7–8). When Roger Ellis addressed the Society of Archivists conference in 1965, he spoke of 'the majesty of the Records […] great stalactites of history' and reflected on the beauty of a medieval deed and tactility of a soft parchment cover - while acknowledging that physical appreciation was not something archivists usually discussed (1965, pp. 43–44). Hugh Taylor was frustrated by archivists' preoccupation with context and their blindness to materiality when the 'whole archival profession has grown, and our work has been structured out of our struggle to deal with, preserve, and dispose of *things*' (1995, p. 18, original emphasis). Influenced by communications theorist Marshall McLuhan, he believed profoundly, like Galbraith, that the information's carrier actively shapes how that information is received and understood (Taylor, 2003). More recently, a fresh wave of voices, from inside the archives and beyond, argue that materiality and meaning are inseparable (Dever, 2013). They appreciate documents as material artefacts which both embody and convey meaning (Breakell and Russell, 2023), bear evidence of creators' intentions (Rekrut, 2014; Breakell, 2023) and underpin the interpretation of provenance, production and career (Velios and Pickwoad, 2012). Dynamic, records' form shapes interactions and fosters connections (Brown and Duguid, 2002; Wiggins, 2023a) and engagement with them is intellectual, sensory and affective (Lester, 2018). Perceiving material contexts is essential (Dever, 2013; Richardson, 2023). Consequently, these advocates hold that engaging with archives as material entities is the route to understanding them. But archivists desirous of documenting and communicating that materiality struggle to do so within the strictures of

standards-based catalogues, because descriptive standards were devised from existing dominant practices which prioritise context (Williams, 2006b, p. 80; Buchanan, 2023).

Descriptive standards

Descriptive standards for library collections were introduced in 1841 with Panizzi's *Rules* for the British Museum; the newest standard, *Resource Description and Access*, was published in 2013 (Dancy, 2012, p. 9). Interestingly, despite the attention which has been devoted to describing manuscripts, there is currently no standard for the online cataloguing of manuscripts (Echard and Prescott, 2020, p. 245). Archival descriptive standards started to appear in the 1980s. The first North American archival standards emulated bibliographic models, blending format-specific elements with multi-level description and respect for provenance (Dancy, 2012).[44] Meanwhile, the British *Manual of Archival Description* (*MAD*, 1986) intentionally moved away from bibliographic structures and data exchange and was designed for managing records in the repository (Cook and Procter, 1991, pp. 8–9). The International Council on Archives' (ICA) descriptive standards, ISAD(G) and ISAAR(CPF),[45] were intended to support the creation of consistent descriptions and facilitate the retrieval, sharing and aggregating of descriptive data (International Council on Archives, 2000, p. 7).[46] Within ISAD(G), widely used in the UK, medium is the sole physical feature assigned an element; even here, in the examples ICA supplied, medium is only described for magnetic tape and microfilm. The ICA's new descriptive standard, *Records in Contexts* (RiC), includes elements for recording medium, how content is inscribed on the medium (handwriting, etc.) and intellectual structure.[47] Conceived as a high-level intellectual model, rather than a set of rules, how it will be implemented remains to be seen.

Institutions using ISAD(G) or other cataloguing standards have to fit collection descriptions into the standard fields, but for archivists describing personal and literary papers, architectural drawings, pattern books and other record types whose physical features are important, it is not evident where to place key physical descriptors. Staff at the

[44] The descriptive standards *Archives, Personal Papers, and Manuscripts* (1983) and *Rules for Archival Description* (1990) were based on the *Anglo-American Cataloguing Rules*, version 2 (AACR2, 1978), a standard for bibliographic description.

[45] *General International Standard Archival Description*, published 1993; *International Standard Archival Authority Record (Corporate Bodies, Persons, Families),* 1996.

[46] ISAD(G)'s development brought to light two schools of thought concerning the purpose of archival description: access or to preserve records' evidential nature by documenting the contexts of their creation and use (Hurley, 1998). This remains unresolved (Bunn, 2013).

[47] Version 1.0 was published in November 2023.

Public Record Office (PRO) struggled to fit map descriptions into the PRO's ISAD(G)-compliant catalogue PROCAT. Archival maps often consist of a published base map which has been annotated, coloured or cut up to fulfil a new function. Strict adherence to ISAD(G) meant recording these features across multiple elements, but staff felt that this would obscure their meaning. Consequently, they put all layering and modification information in the *Scope and Content* field, along with scale, projection and orientation. As this produced a long prose description, for consistency, PRO staff had to define a standard order in which to list the features (Janes, 2012). Some organisations have devised their own descriptive methodologies. The Group for Literary Archives & Manuscripts' guidelines (2013) advise ISAD(G) cataloguers to record physical elements in *Scope and Content*, for example, manuscript status (autograph, typescript) and the presence of annotations and illustrations. RIBA produced guidance for cataloguing architectural drawings, combining elements from MARC and MAD to create a template with fields for aspect, purpose and stage, medium, scale and watermark (Gawne, 2003).[48] In the Scottish Brewing Archive, company production records and marketing strategies are accompanied by beer mats, cans, mirrors and bar towels. With no controlled vocabularies or guides to refer to, the archivists had to decide upon standard names for these objects. Their physical characteristics are described in detail and staff have tried to ensure that descriptions are consistent, but variations have occurred. Similarly, ASC staff had to devise a methodology for describing patterns in Stoddard International's carpet design archive (Paterson, 2023). There are no sector guidelines for describing pattern books. Description of material features is not limited to item-level records. The form and appearance of a collection as an assemblage can convey information about its creator; for example, how an artist has curated their personal archive can illuminate their creative process or attitude to their legacy (Breakell, 2023). Again, the challenge is where to describe this contextual material information in a catalogue; in ISAD(G), the *Administrative/Biographical history* field is a possible option but not ideal, Breakell suggests. Standards are intended to promote consistency and facilitate data sharing. Long before computers, Jenkinson recognised the research potential of aggregating collections data and the commensurate need for standardised metadata and terminology (1937, pp. 129–130). The absence of guidance and vocabularies for recording in-depth physical descriptions, especially in ISAD(G), mean

[48] Gawne's example for Rosneath House (Argyll and Bute) showed each plan listed individually with its aspect, scale, etc. Viewing these plans in the current RIBA online catalogue, all fifty-one plans are listed in one record. The entry presents the medium for each plan as a block, followed by fifty-one purpose and stage descriptions, etc. With no reference numbers, the viewer has to count through each list to pick out the details for a specific plan. A change in software or some other issue has rendered the catalogue virtually unintelligible.

methodologies chosen by archivists and institutions may not be consistent. Data sharing becomes complicated (Paterson, 2023), potentially reducing collections' visibility and hampering the application of digital data analysis techniques.

Colour

An important feature of maps, carpet designs and textiles is colour. Nancy Bartlett (2011) argues that the archival sector lacks a theoretical awareness of the informational and evidential role of colour. In her view, archivists' manuals and articles on the value of archives contain few, if any, explicit references to colour, not even those advocating for greater visual literacy and material awareness within the profession.[49] Bartlett points out that related professions, e.g. archaeologists, have systematized ways of referencing colours, but archivists have not. She sees this lack of awareness played out in copying practices. Monochrome microfilming rendered colour-coded information on maps and drawings unintelligible. While archivists had little choice in the 1960s, Bartlett is frustrated that they, and commercial suppliers, have perpetuated this data loss by scanning these microfilms, rather than digitising the original records in colour. She suggests that, by cultivating greater sensitivity to the presence and functions of colour, archivists could develop a clearer understanding of their collections.

Given the extent of their holdings, archivists have to choose 'good enough' approaches to maximise return. Scanning microfilm, slides and negatives was a cost-effective method to fulfil audience demand for digitised sources when digital technologies were expensive. Now digital colour reproduction is ubiquitous, practices have changed. At a 1992 conference on microform, participants disagreed over the benefits of colour microfilming modern, colour-filled newspapers (Hamilton, 1992; Luft, 1992). Today, the National Library of Scotland digitises all its historic newspapers in colour (Digital Transition Manager, 2022). In 2011, when ASC staff wanted to describe colours on Stoddard-Templeton carpet designs, they turned to British Standard paint colour charts because there was, as Bartlett said, no accepted archival standard (Assistant Archivist, 2022). Now, a handful of museums and galleries are using computer algorithms to identify the

[49] Bartlett praises J. Sassoon, H. Taylor and J. O'Toole for their efforts in promoting material properties, but regrets that they do not address the role of colour.

predominant colours in works of art and artefacts. This information is incorporated into online catalogues, allowing users to browse, filter and navigate collections by colour.[50]

Re-conceptualisation of records

While voices advocate for material awareness, and colour digitisation and algorithmic analysis provide insights into records' material features, contemporary theoretical conceptualisations of a record are diminishing archives' artefactual nature. To accommodate born-digital records, definitions concentrate on records' intellectual role representing functions, and structure is seen as insignificant (Sundqvist, 2021). Cook envisages a record as a fluid, 'conceptual data "object", controlled by metadata'; in his view, description's function is to capture a record's relationships and uses within the creator's environment (2001a, pp. 22–23). Geoffrey Yeo conceptualises records as 'persistent representations of activities' (2007, p. 334). He emphasizes that representations can be multiple or partial but does not dwell on their form. The International Standard for records management defines records as 'information created, received and maintained as evidence and as an asset by an organization or person, in pursuit of legal obligations or in the transaction of business' (International Organization for Standardization, 2016, section 3.14). The International Council on Archives' definition is 'the documentary by-product of human activity retained for their long-term value' (International Council on Archives, 2016). Theory needs to embrace digital recordkeeping, but conceptualising digital records as amorphous, logical objects conflicts with the reality of managing decidedly material digital records. A wealth of workshops, conferences and articles has addressed concerns about file formats, decay, migration and authentication.[51] Interestingly, these discussions have less to say about documenting the evidential information embedded in digital records' material forms. A person's choice of software, font and formatting conveys information about their personal outlook or work environment, just as their choice of pen and paper does, and should be preserved in the collection metadata.

Archives, therefore, be they physical or digital, have material features which embed information supporting the interpretation of their creation, provenance, use and content. Form and structure shaped how records were used in their active life and

[50] The Smithsonian Cooper Hewitt Museum, Rijksmuseum and Art Institute Chicago are among those who have implemented this.

[51] The Digital Preservation Coalition's resources and activities illustrate the effort within information management and other fields to manage material facets of digital records, see www.dpconline.org (accessed 19 Aug 2024).

impact how they are managed, accessed and interpreted as archives. Managing the physical reality of records has always been at the heart of archival practice but the knowledge about materiality which underpins professional activity has not generally been the subject of theoretical discussion. Instead, context-centred theory born from managing government records has dominated methodology, practice and hence standards. But in recent years, voices have argued for a conscious engagement with records as material artefacts. The next part of this chapter looks more closely at material attributes of physical records, especially textile company records, and examines the range of evidential information they embed about the creation, career and use of those records and the value of that information in interpreting content and context.

Unpacking quantifiable physical attributes

Material properties of archives comprise both quantifiable attributes, which can be measured and analysed, and unquantifiable qualities, like texture and sound, which are perceived by the senses. Quantifiable attributes of records include form, mass and component materials. A paper record might consist of a weightless scrap of paper which fits in the palm of the hand, a single sheet of paper which has been folded, rolled or kept flat, or several pages fastened together or placed loose in a folder. It can be large and heavy or small and portable; its form and construction can be designed to impress or be practical, and makes it easy or cumbersome to use. The Codex Amiatinus is a large (50cm tall and 25cm deep), early eighth-century Bible made with expensive materials, because it was designed to impress its recipient, Pope Gregory II, and be displayed on a lectern (Sunderland Local Studies Centre, 2012). English Exchequer Pipe Rolls (TNA E 372) consist of pairs of parchment membranes c.400mm wide and up to 1500mm long, written on both sides. The accounts for one year were collated by stitching the tops of that year's membrane pairs together (maybe twenty to thirty pairs), then rolling them into bulky bundles (Pipe Roll Society, 2024). The format presumably worked for the Exchequer but makes them difficult for researchers to handle and use: the PRO made a special wooden reading stand to assist researchers studying them.[52] Historian Arlette Farge found volumes containing eighteenth-century lists of prisoners so unwieldy that she, too, needed to brace them against a wooden stand in order to consult them (Farge, 2013, p. 13). Textile

[52] My thanks to Andrew Prescott for information about the stand. Images of selected rolls are published on the Anglo-American Legal Tradition website, see, for example, aalt.law.uh.edu/HenryV.html (accessed 19 Aug 2024).

manufacturers' agents visited potential customers to show off the firm's wares and win orders and needed samples in a format which was portable, easy to manage, but also appealing to the eye. The manufacturers therefore produced pocket-sized, folding pattern cards for their sales representatives to carry round (Sykas, 2021). For example, Anderson & Robertson Ltd. produced a folding card for its *Blue Bell* range of artificial jumper silk which was not only portable, but by opening out, showcased the array of colours on offer and the texture and sheen of the yarn (Figure 12).

Figure 12. Artificial silk sample card, Anderson & Robertson Ltd., 1950s (ASC UGD029/6/5)

In European archives, text-based records are usually constituted from materials such as paper, parchment, linen, thread, metal fasteners, glue, leather, ink, graphite and pigments. Occasionally, one comes across more unusual materials, for example, pages and their texts which have been woven using silk yarn.[53] Form, mass and materials embed choices made by those involved in the creation of the record artefact about the colour, dimensions and quality of the materials and intended purpose. They tie into contemporary cultural conventions associated with these material attributes to convey to viewers how they wish the item to be perceived. For example, a large-format, thick, glossy, bright white paper page, the type associated with high-end art books, suggests greater investment in the aesthetic properties of production than the off-white, rough page of a cheap octavo

[53] In the late nineteenth century, a number of books were woven on jacquard looms, see Westerby, M.J. (2019) *The Woven Prayer Book: Cocoon to Codex*. Paris: Les Enluminures. The University of Pennsylvania holds a silk prayer book https://franklin.library.upenn.edu/catalog/FRANKLIN_9978137695203681 (accessed 19 Aug 2024).

paperback (Mak, 2012, p. 10). In one of Patrick Mitchell's daybooks (Figure 13), smooth cream sheets of paper alternate with rough pink blotting paper. The inclusion of blotting paper tells us that the manufacturer clearly expected purchasers to write in the notebooks using pen and dipping ink, rather than pencil. The firm's use of visually contrasting papers, distinct in colour, thickness and surface texture, and their alternating arrangement, signals to the contemporary purchaser, familiar with the conventions and process of blotting ink, how the volume's pages are designed to function. Mitchell reads the materially encoded message, writes on the cream paper pages and leaves the pink blotting paper pages blank. A twenty-first century writer, armed with a Biro and unfamiliar with the concept of blotting paper, might choose to write on both the cream and pink pages of the notebook. Were a digitiser to decide to only photograph the cream pages and hide the existence of the pink pages, a researcher's understanding of this volume, how it functioned and the cultural information it embeds would be compromised.

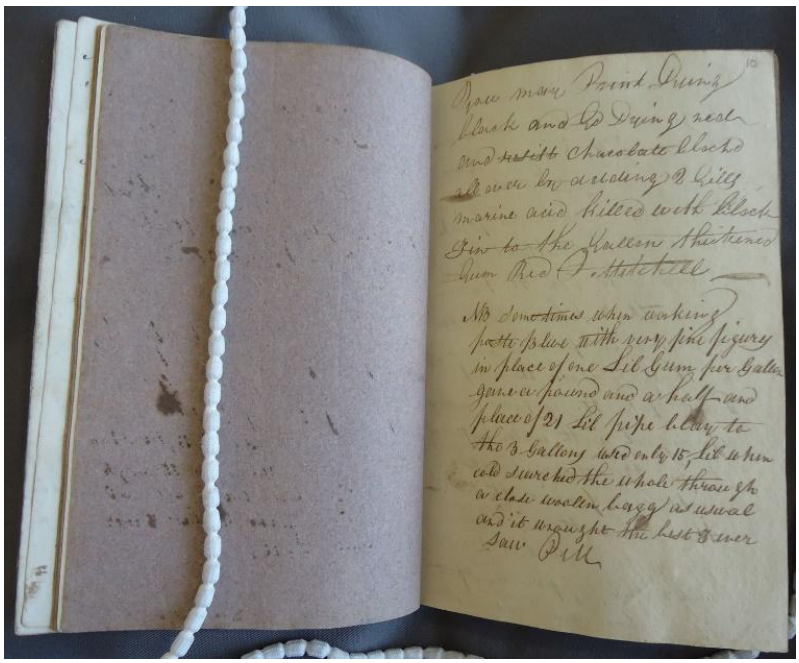


Figure 13. Notebook with integrated blotting paper, William Gillespie & Sons, 1806-1807 (NLS MS.17962)

Form and materials may also shed light on the user's requirements. We might infer that Mitchell liked the convenience of integrated blotting paper, or that blotting paper was not reliably at hand during his working day. David Ligat & Sons Ltd. requested wholesale stationer A & W Kennedy, Ltd. of Pollokshaws to use stiff, very shiny, teal-coloured kraft-like paper for the pages of their new pattern book (Figure 14). The colour provides an effective backdrop for the pale muslin net fabrics glued into the volume, showing off the

weave and designs far better than the off-white paper used in other Ligat pattern books.[54] Durability and resistance to regular handling may also have been deciding factors; if so, the firm chose well as, nearly a century on, the pages are free of tears and show only slight creasing and wear in the lower right corner where users grasped the paper to turn the pages.

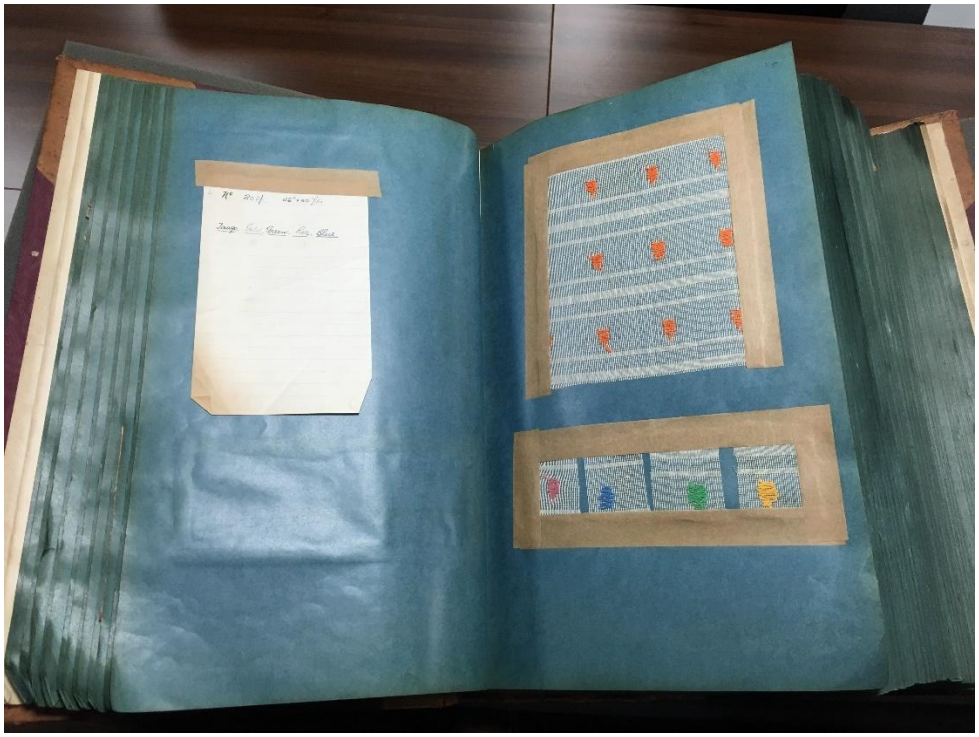


Figure 14. Pattern book with teal pages, David Ligat & Sons Ltd., 1928 (ASC UGD093/1/2)

Volumes are easily recognisable as three-dimensional artefacts, but a single sheet of paper or parchment has its own three-dimensionality which reveals valuable data about the document's career. Endres describes the page of a medieval manuscript as 'a three-dimensional phenomenon, an organic substance that ages, that creaks and fusses when turned.' (2019, p. 6). Paper may bear evidence of its manufacture in the form of impressions from the papermaker's frames or watermarks. Its surface may be disturbed by implements used to add text, be that pens, rulers or indentations and extrusions left by the letterpress printing process, almost invisible features which standard digital photography struggles to capture and which are therefore lost to the digital user. Dog-eared, dirty corners and disintegrating folds testify to use and handling (Werner, 2012, pp. 7–8; Campagnolo, 2020, p. 75). A letter sent to Patrick Mitchell in 1811 (ASC DC90/7/4/2)

[54] For example, in pattern book UGD093/1/1, the detail of the weave is lost against the off-white pages.

carries the folds made by the sender, a drop of red sealing wax, discolouration caused by water and mould and a hole formed by hungry silverfish.

The evidential value of bindings and wrappings can be overlooked by archive and library staff. Until recently, libraries often replaced worn bindings on rare books and manuscript codices (Senior Assistant Librarian, 2021; Pollard, 2022). While this was well-intentioned, vital data about the artefact was lost. Szirmai (1988) deplored how original Carolingian bookbindings in the Badische Landesbibliothek Karlsruhe were subjected to transformative conservation treatments or even entirely removed by conservators in the 1960s and 1970s, without any detailed record being made of the original structure and binding methodology. Szirmai underlined how these ancient bindings are historical artefacts worthy of study and not just nebulous information carriers. Despite being considerably more modern, pattern bookbindings can preserve useful information about the records' provenance, in particular, any changes of ownership which took place (Sykas, 1999, p. 63). When NMS staff took custody of over two hundred United Turkey Red Company (UTR) pattern books, they discovered that many of the volumes had had their original leather bindings removed, when or why is not known. Six companies amalgamated to form UTR (Peel, 1952) and evidence of ownership and dating recorded on surviving bindings helps custodians and researchers to assign volumes to their company of origin (Nenadic and Tuckett, 2013, pp. 16–20).

While today's conservators meticulously log the repairs they undertake, modifications made by archive staff to original enclosures are less likely to be documented. Records are deposited in a medley of folders, envelopes or paper wrappings tied with string or pink legal tape. Archivists frequently remove records from these decrepit, acidic wrappers and place them in acid-free folders to protect them. Ring binders and brown envelopes may seem evidentially insignificant compared to Carolingian bookbindings, but these signs of how owners physically organised their papers can convey information about how they used and perceived them. As with the Carolingian bindings, if archivists fail to document these material changes, potentially significant evidence is lost, impacting interpretation (Rekrut, 2005, p. 25; Yeo, 2010, p. 95). Repackaging papers into homogeneous archival folders also alters the impression researchers receive of their past curation and changes the experience of interacting with them (Lane and Hill, 2010). Jenkinson preferred papers to be retained in the depositor's enclosures; if they had to be removed, he stipulated that 'most meticulous notes must be made of the precise nature of the 'filing'' (1937, p. 59) – but his advice did not become embedded in UK archival practice. Joan Schwartz has

argued that archivists should retain photographs within the albums in which they were deposited, rather than disbinding the albums to store the pages separately, or transferring the photographs to archival envelopes. She points out that breaking up the album results in the loss of the physical evidence communicated by the organisation of the pages, the placement of the photographs, physical relationships between photographs and their accompanying captions, and the form of the album itself (Schwartz, 2002).

Graphic designer FHK Henrion had customised boxes made in which to store the visual outputs of his business commissions and the boxes were carefully set out in a long sequence in his office. When his archive was deposited with the University of Brighton Design Archive, the design records were transferred in their special boxes. Despite the acidic nature of these boxes, the archivists are reluctant to remove the papers from them because the boxes are intrinsic to understanding Henrion's relationship to his records, which communicated, Breakell felt, his pride in his professional achievements (Breakell, 2023, 2024). Similarly, at Sunny Banks Mills, production staff stored textile samples in long cardboard boxes, which they labelled with codes and notes relating to their production and function. The textiles remain in these boxes in the archive, although the boxes are falling apart, again because the curator feels that the boxes are as evidentially significant as the textiles they hold, capturing aspects of business operation (Moaby, 2022). Were either of these sets of boxes to be finally deemed as unsuitable for the ongoing storage of their contents, photographing the boxes to show their form and labelling, and retaining one or several as exemplars, would be important steps to preserve the evidence they capture about the management of these businesses and how the records were perceived by their owners.

Folders and bindings are designed to keep pages together and protect them from dirt and dust. Dust is viewed by researchers as an occupational hazard, or sometimes a source of information. Historian Alastair Durie (2012) learnt as a young postgraduate that research in private and corporate archives could involve lots of dust and that a boiler suit and face mask were as useful as a pencil and notebook. Steedman (2001, p. 22) reflected on how book dust's toxicity could poison the scholar. The hardened layer of dust on bundles of judicial papers indicated to Arlette Farge (2013, p. 2) that they had never been opened since the papers were tied together two centuries ago. For archivists and conservators, dust is a professional bugbear. Archivists rail futilely against the stock epithet 'dusty', employed routinely and uncritically by journalists and writers whenever they mention an

archive (Schmuland, 1999, p. 42).[55] Where possible, new accessions to the archive are carefully cleaned during processing. But Campagnolo (2020, p. 54) and Gullick (1988, p. 10) advocate against over-zealous cleaning, because dust can be scientifically analysed to provide data on the places where the artefact resided during its career. Kathryn Rudy (2010) used a densitometer to analyse levels of dirt across a selection of medieval devotional manuscripts to identify those parts which had been touched most by past users. While the author is not aware of similar research into pattern books, it is possible that grains of ingredients or soot might be captured within their bindings and reveal interesting data under analysis.

Unpacking unquantifiable qualities

Unquantifiable material qualities comprise the texture of a record's components, the sounds it makes when handled, smells which emanate from it, and even taste. Researchers and staff are hopefully not in the habit of licking documents, but the aforementioned dust, emanating from a document's paper, parchment, leather, glues or past home, can be inhaled and hence tasted as it wafts off the pages, as Steedman (2001) warns. Sarah Werner urged her students, 'Go ahead and smell your book!' (Werner, 2019, p. 105). Smell imparts insights into the smoking habits of a past user (Russell, 2018, p. 205), the deteriorating condition of old books (Strlič *et al.*, 2009; Howell and Snijders, 2020, p. 2),[56] variations in book production processes or even public health practices. A researcher in Antwerp[57] discovered that early books printed in Germany for export smell dissimilar to contemporary volumes which were circulated within Germany, probably because they underwent different post-printing sizing processes. This distinction opens up avenues for research into both book manufacturing and circulation practices (Werner, 2012, p. 7). Meanwhile, researchers interested in the prevention of the transmission of infectious diseases through the postal system sniff letters to detect whether they were doused in vinegar or other substances by postal or public authorities to disinfect them (Pearson and Miles, 1980; Brown and Duguid, 2002, pp. 173–174).[58] The noses of custodians of acetate

[55] Both perspectives are portrayed in a newspaper article celebrating the Mitchell Library, Glasgow's flagship public and reference library. The journalist refers to the 'dusty aroma', while the librarian counters that, in the past, someone was employed specifically to dust the shelves (Wilson, 2023).

[56] According to research by Strlič *et al.*(2009), the distinctive smell of old books is caused by volatile and semi-volatile organic compounds off-gassing from the paper, leather, etc. The researchers concluded that analysis of these compounds could provide information on the stability and condition of a book's components.

[57] Werner quotes this story but does not name the researcher.

[58] The official practice of fumigating mail started in southern Europe at the end of the fifteenth century. It persisted until at least the 1960s (Pearson and Miles, 1980, p. 112).

film collections are also alert to the smell of vinegar, this time as a warning sign that the acetate is decomposing. Perhaps fortunately, smells associated with textile production do not linger in pattern book samples. Frequent washing during bleaching, dyeing and printing cleansed the fabrics of malodorous ingredients such as dung, urine and blood (Turnbull, 1951).[59] Archive users and staff will certainly be familiar with the odour of damp and mouldy paper, as records frequently arrive at the repository suffering the effects of prolonged storage in damp, poorly ventilated cupboards. Given the vast quantities of water employed in textile manufacturing and manufactories' waterside locations, textile records have been particularly susceptible. When staff from NMS acquired the defunct United Turkey Red Company's pattern books from their waterside Alexandria factory in 1961, the paper pages were disintegrating (Tarrant, 1978, pp. 62–63).[60]

If archive users and staff are unaccustomed to thinking about the evidential nature of dust and smell, sound is probably another quality which passes unnoticed. Yet the sounds made by paper, bindings and textiles convey data about their structure and composition. Tracing paper being unrolled rustles; stiff cartridge paper clatters. Wool makes little sound when handled, but taffeta will swish. The V&A museum has recorded a series of videos showcasing the sounds made by books and artefacts as staff interact with them.[61] When a curator turns the parchment pages of a large medieval choir book, the audience hears the pages rattle. The sound amplifies the information viewers gain visually from watching the book/curator interaction, providing a sense of how stiff the pages are and what they are made of.

Texture, too, can convey data not just about the quality, manufacture and constituency of a document's components but also the context of its production and the experience of using it (Werner, 2012, p. 7). The thick kraft paper pages in Ligat's 1928 pattern book (see Figure 14) are easy to grasp and turn, so a worker could quickly leaf through the book to the required page. In comparison, the paper found in outgoing letter books, a common record type in late nineteenth- and early twentieth-century business collections, is similar

[59] When John Lettice toured Milton printworks in 1792, he commented that the foul-smelling water draining from the dyeing vats and boilers filled the air with its unpleasant vapour (Lettice, 1794, pp. 194–195).

[60] While archivists probably rarely think about smell, museums actively exploit smell's ability to evoke the past. The JORVIK Viking Centre, York, which opened in 1984, was an early adopter and employed smells referencing local industries and foodstuffs to contribute to the immersive experience (Findlay, 2023).

[61] The films are available on the V&A's YouTube channel www.youtube.com/playlist?list=PLe2ihXndm5jseo_RGEGeEbPy09z0nlmZE (accessed 19 Aug 2024).

to tissue paper, being thin, floppy and easily torn, making it awkward to turn efficiently. Firms copied outgoing letters using a letterpress, so they had a copy for reference. The thin paper was essential to the copying process and signposts to archivists and researchers that the letters were produced using that technology (Antoine, 2009).[62] Texture can signal that materials are damaged or deteriorating, as they feel different to undamaged counterparts (Howell and Snijders, 2020, p. 2), for example, water-damaged paper lacks the crispness of dry paper.

Texture is an essential attribute of the fabrics embedded within the pattern books. How fabrics feel against the skin is important to customers and hence manufacturers. The thickness, fluidity and surface texture of pattern book samples communicate valuable information about the type of fibres present, the manufacturing processes employed to spin, weave and print the fabric and their intended uses - at least to those who can interpret the encoded data (Sykas, 2005, p. 11). Texture can be used to distinguish textile types such as cotton, wool or rayon. David & John Anderson Limited were renowned as manufacturers of lightweight cotton fabrics, especially shirting and gingham (David & John Anderson Limited, 1952). A visual survey of their surviving pattern book confirms shirtings and ginghams are present, but a haptic exploration reveals the textural diversity of their products. Smooth, thin fabrics and stiff, shiny ones are juxtaposed with samples in thick, soft basketweave or corded lines (Figure 15).

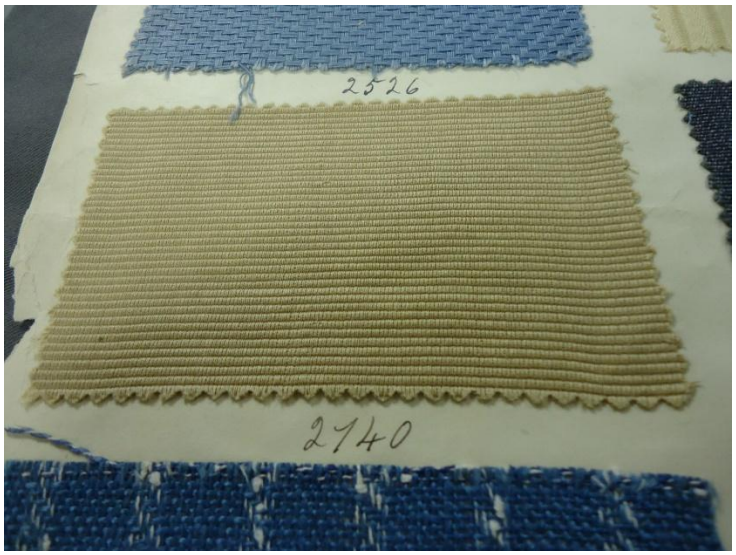


Figure 15. Texture of fabric samples, David & John Anderson Limited, 1890-1910 (ASC UGD022/8/1/2)

[62] The copy press method was introduced in the nineteenth century as a way to copy handwritten documents. A freshly written letter was placed against a sheet of damp copy paper and placed in a press. The still wet ink enabled the text to be transferred to the blank sheet as a mirror image. The copy letter was read through the paper, hence the need for thin paper (Antoine, 2009).

Texture can also be creative and artistic. Between 1896 and 1914, Donald Brothers of Dundee wove linen furnishing fabrics whose innovative decorative textures and colours were an explicit expression of their engagement with the Arts and Crafts movement's appreciation of visual and woven texture. Although woven on power looms, their fabrics conveyed the irregularity and individuality of the handwoven textiles which formed part of the Arts and Crafts aesthetic (Douglas, 1997).

Appearance, layout and form

The material characteristics of a document encompass not just its structural form, composition and smell, but also its appearance, and the presentation and layout of its contents. These too contain data about its creation, function and use over time. Treharne celebrates medieval scribes' 'pleasure' in producing an aesthetically satisfying page layout by balancing margins and reducing empty space with line fillers and pen flourishes (2021, pp. 141–142). Jerome McGann (1991, pp. 79–80) describes how William Thackeray not only designed decorated initials, vignettes and illustrations for *Vanity Fair*, but also specified where he wanted them placed, because they actively contributed to the narrative. Bonnie Mak (2012) argued that format, layout and paratext[63] shape reception of a text, reading practices and dissemination. Within pattern books, the layout and presentation of fabric samples, placement of text and the juxtaposition between the two suggest how they were used. A pattern book assembled by Messrs J.H. Young & Co. (Figure 16) has 'Fancy dress muslins' and the company logo tooled in silver on the front cover, which is covered in green buckram. Inside, the samples are presented in two columns per page, with either two or four samples in each column; they are grouped into design families. The samples are neatly backed with coloured paper to enhance the colours. The pattern code for each design has been printed on a small label embellished with a decorative black border; this is glued to the sample. Cross-reference information is stamped at the top of each page. This smart volume was presumably shown to prospective customers to solicit orders. In David Ligat & Sons Ltd.'s 1928 pattern book (Figure 17), each double-page spread has textual information on the left-hand page and a fabric sample on the right-hand page. The layout implies that the text and sample are related. As writing ink would not show up clearly on the teal-coloured pages, textual information was jotted on pieces of lined notepaper. Both the notes and samples were attached to the pages using brown paper tape. Unlike the

[63] Paratext is the apparatus which supports the text, such as page numbers, chapter headings and footnotes.

Young volume, this volume's workaday appearance suggests its place was in the workshop as a production tool.

Figure 16. Pattern book of dress muslin samples, J.H. Young & Co., early 20th century (ASC UGD093/1/4)

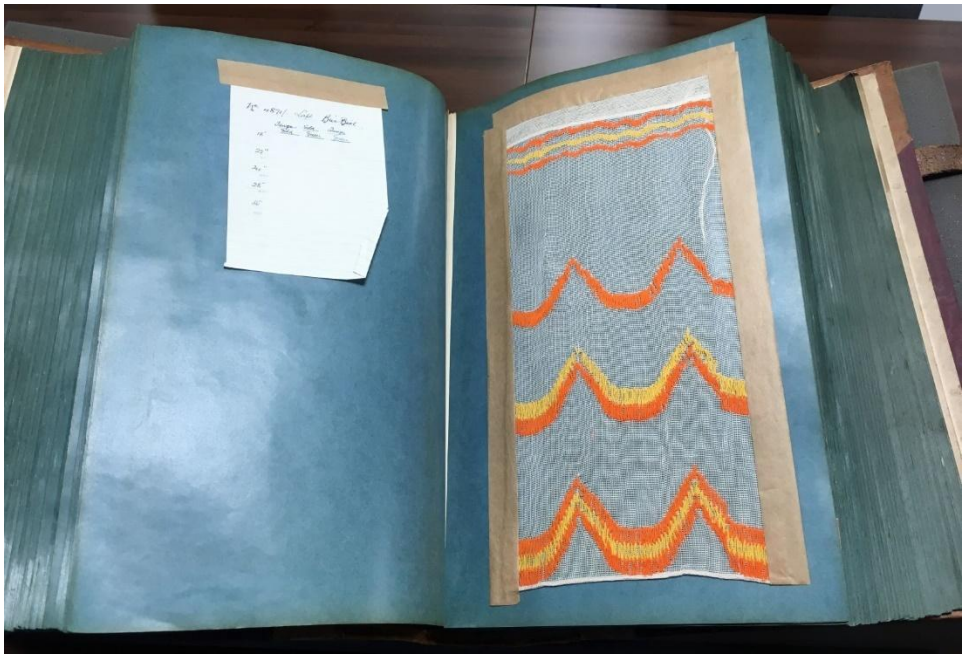


Figure 17. Pattern book, David Ligat & Sons Ltd., 1928 (ASC UGD093/1/2)

As with the appearance of the volumes and their pages, the appearance of the embedded textiles also contains a wealth of information about the fabric, its structure, manufacture and intended function. Rougher woollen yarns form an S-twist when they are spun, smoother worsted yarns form a Z-twist. Microscopic measurement of woollen yarn fibres

can help identify the type of fleece and hence lead to inferences about the breed of sheep (Satchell *et al.*, 1990). Finely spun warp threads and high warp density across the fabric width indicate good quality fabric (Quye, Cardon and Balfour Paul, 2020, pp. 149–150). The colours visible on the fabrics suggest the dye ingredients or colouration processes which might have been employed, especially when considered alongside dating evidence. A piece of bright red cotton fabric in a pattern book dating from the 1850s might have been coloured using the Turkey red process. If the red looks faded, non-colourfast dyes like brazilwood may have been used. A green dye used by J.H. Young & Co. has proved to be less enduring than other colourants they used, and green samples in their 1908-1909 pattern book have faded at the edges, while the blue, black and brown colours have remained uniform (Figure 18).

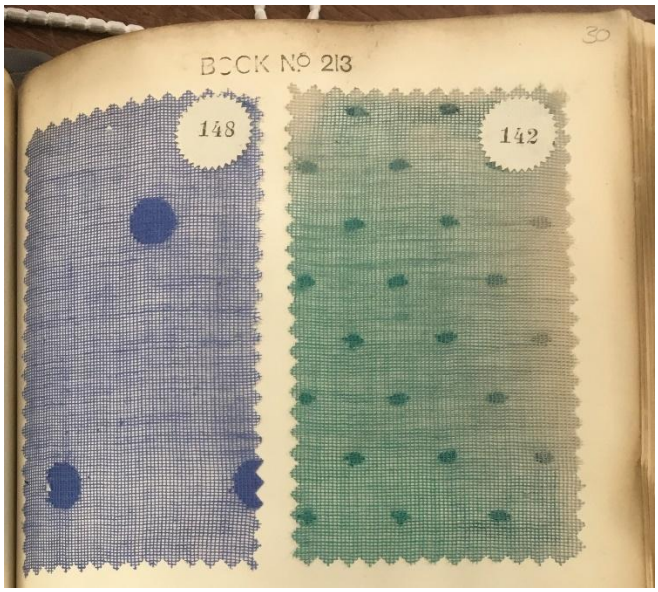


Figure 18. Faded green dye on muslin filet, J.H. Young & Co., 1908-1909 (ASC UGD093/1/5)

The organisation of a document's contents, its intellectual form, also supports understanding of its function and use. We readily distinguish between a children's storybook, dictionary and academic journal because we recognise the conventions inherent in each form concerning the presentation and intellectual structure of the content (Deegan and Tanner, 2002, p. 118). Certain forms of business data are structured according to standard practices, for example, minutes or double-entry book-keeping. Firms also employ personalised data management tools to fulfil individual company needs. The late nineteenth century gave rise to a plethora of customised printed blank volumes and forms, ruled and laid out in accordance with each customer's requirements and the intellectual arrangement of these documents reflects the business functions they were designed to

tabulate and track (Gitelman, 2014, pp. 22–23). In the 1930s, Motherwell yarn spinners Anderson & Robertson Ltd. instructed manufacturing stationers Begg, Kennedy, & Elder Ltd. how they wanted their new sales record volume laid out (ASC UGD029/6/10). The stationers duly ruled ten columns per page and printed column headings to record sales of 'silk yarns', 'parcel working' and 'bobbins and cases'. The intellectual form and function of pattern books can be complicated. To the initiated, there are obvious differences between, say, a dyer's book of instructions and those compiled by a colourist for printing, but for non-specialist heritage professionals and researchers, the differences may be less evident (Sykas, 2007, p. 23). Textual information about fabric widths, ingredient quantities and manufacturing processes can be cryptic to modern viewers, either unintentionally, because it was clear and sufficient for the original users, or deliberately, to protect valuable commercial data from prying eyes (Sykas, 2005, p. 12).

Material relationships

A distinguishing feature of archival documents, compared to many medieval manuscripts or printed books, is that they usually belong to a group of related material. In archival theory, the need to understand the structure of the group, or fonds, and the way in which each item relates to the others is a core principle; indeed, archival theorist Eric Ketelaar described a fonds as 'a fabric of relationships and context' (1996, p. 37). When records are deposited with a repository, they may be bound literally by authorship, provenance, function, a collector's passion or sometimes just happenstance.[64] Their physical organisation or signs of it, for example, letters tied into bundles by year of receipt, or marks from rusty paperclips, indicate how they were curated by past owners and may shed light on their function or how they were perceived by those who used them. As Jennifer Morag Henderson researched the correspondence of Jean Gordon, Countess of Sutherland, she found it instructive to see how Gordon had written her letters, emphasizing or deleting words as she wrote. But Henderson also found it productive to examine how letters were grouped. She remarked, 'After I had found a letter written by Jean, I could see what it was filed next to, which brought up new discoveries of correspondence, and often opened up new areas of understanding.' (Henderson, 2023, p. 8). Historian Ida Jager studied the archive of the Public Works Department of Amsterdam, where she found that the way in which the spatial planners had collated notes, designs, folded drawings and solutions communicated how they had used the records and how they valued them (Jeurgens, 2013,

[64] Repositories do, of course, acquire single items as well. A pattern book rescued from a skip may be the sole survivor from a company archive.

p. 43). Some textile firms controlled loose paperwork by pasting it into blank volumes. At Milton printworks, consignment notes were glued untidily into scrapbooks, while David & John Anderson Limited managed the correspondence they received from their agent Henry Chapman & Co. by inserting it in date order into a parchment-covered volume (Figure 19), folding and interleaving letters to maximise space, although at the cost of easy reference. If these notes and letters were removed from their volumes in the interests of conservation, and, especially if no visual record were made of their original arrangement, researchers' understanding of the firms' administrative practices would be compromised.

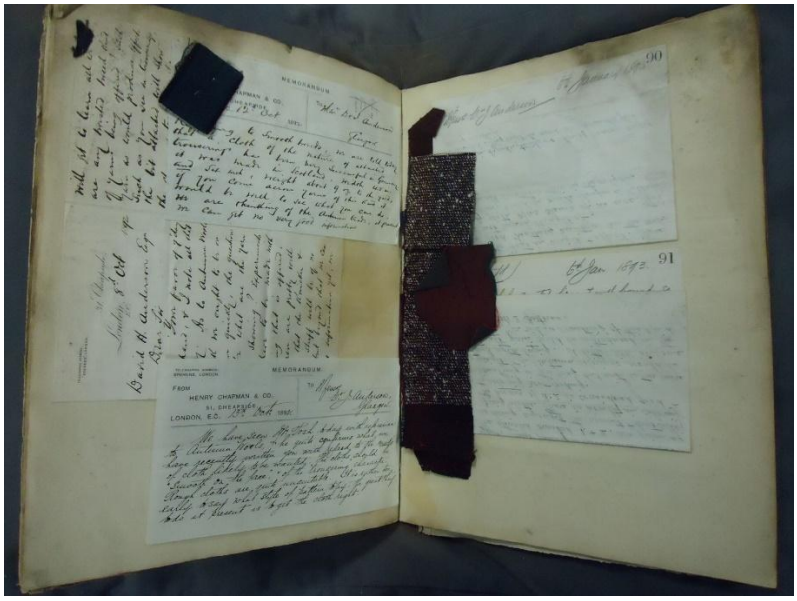


Figure 19. Design correspondence, David & John Anderson Limited, 1892-1910 (ASC UGD022/8/1/1)

Studying how a whole assemblage of records was curated and stored can provide insights into organisational administration, local rivalries or individual careers. By studying eighteenth-century inventories listing which records were stored where in Dordrecht Town Hall, Peter Horsman ascertained their likely function and who had permission to access them. He also realised that charters which ought to have been stored in the locked cabinet provided for that purpose were shelved elsewhere because the town council and local guilds were in dispute and the guilds held the keys (Horsman, 1999). After having seen photographs of graphic designer FHK Henrion's office, with his archives carefully arranged in customised boxes, Breakell (2023) concluded that Henrion's archive was as much 'a demonstration of career prestige and achievement' as a pragmatic filing system. How a music DJ ordered their vinyl collections on their shelves (e.g. by artist, chronologically or by tempo), where they situated groups of records within their house,

and the predominance of one or other genre or style provide insights into the DJ's set plans, how they worked and the music they listened to for personal enjoyment (Maloney and Schofield, 2022). For researchers, the process of physically working through series of records and seeing how they are grouped helps them to recognise patterns across the records (Latham, 2011). What patterns they observe and what meaning they derive from them will vary for each person and depend on their research questions and knowledge. Recognising patterns makes items which disturb that pattern stand out and prompts the researcher to ask why and when that outlier file or document came to be in that grouping. But for users who cannot physically see how records are grouped, identifying patterns, outliers or evidence from physical proximity can be difficult. Excluded from repository strongrooms, researchers cannot comprehend the physical extent of a collection or how it functioned as a body (Dever, 2019, p. 13).[65] Working in the Sutherland family archive, Henderson was able to browse letter bundles but within the searchroom, if researchers are handed items singly and do not see how they physically relate to other papers, making connections is harder (Durie, 2012).

Among the pattern books ASC acquired from David Ligat & Sons Ltd. are two volumes which are stamped with the name of a rival muslin manufacturer, Messrs J.H. Young & Co. of Glasgow. They are smartly bound, with the volume title and company logo tooled on the cover, the fabric samples neatly glued in and furnished with printed labels. The volumes' almost identical appearance shows that they belong together and implies that they served a similar function. Viewed individually, they provide a useful record of Young's output and business methods. Viewed as a pair, the researcher notices slight differences between them, such as the format of the labels, and can compare the fabric designs. Seen alongside Ligat's own pattern books, their smartness contrasts with the workaday appearance of Ligat's binders, into which jotted notes and samples have been collated with brown parcel tape, and draws attention to the Young volumes as anomalies. The researcher is prompted to wonder when and how Ligat acquired Young's volumes, and for what purpose. Perhaps David Ligat wanted to check out a competitor's designs or scrutinise Young's manufacturing techniques. Seeing these two J.H. Young volumes without comparing them to Ligat's, or encountering them in an online catalogue, where it would be easy to miss their physical context, could result in researchers overlooking an important stage in the careers of these two pattern books. Hugh Taylor (1995) suggested

[65] All items in a collection are probably not stored contiguously in any case, but even seeing the cluster of boxed material conveys some idea of extent.

that it could be beneficial for the public to see a physical display of an archival fonds so they could appreciate how the body of records operated collectively. While the visual immediacy of such a display is appealing, one imagines that labelling, an audio guide or staff tour would be necessary to explain the records' many-to-many relationships to viewers. Thoughtfully-conceived digital tools are therefore potentially better placed to communicate collections' relationships. Online galleries of digitised records could include photographs of whole series or collections as a digital version of Taylor's display, but rarely do. Online catalogues which display search results within their collection context, or allow viewers to browse (Breakell, 2023), or which use linked data to convey relationships between records and associated parties, qualities incorporated into the Glasgow School of Art catalogue examined in chapter 6, are other ways to show collection relationships. Mitchell Whitelaw (2015) has advocated for archive interfaces which communicate the scale and complexity of collections and allow users to browse, and his use of data visualisation to deliver this, along with other examples of the effective use of digital tools, are examined in the next chapter.

Connection

Among the Prize Papers archive is a notebook in which Michel Le Pape, second captain of the *Postillon* of Nantes in 1747, kept track of shipboard administration (TNA HCA 32/143/19). Inside the book is an inky quill pen, possibly the one M. Le Pape was using when his ship was seized by an English merchant vessel (Cardamone, Haasis and Finnegan, 2022).[66] Seeing a photograph of the pen resting on the open notebook prompts the viewer to reflect upon the moment when the *Postillon* was seized and wonder what happened to Le Pape and his fellow crew members. Records as material artefacts have the capacity to foster within those who engage with them a sense of connection with the past creators, users and events associated with those documents. When the Byrd International Singers performed in Edinburgh, they visited the NLS to see the Scone antiphoner, a sixteenth-century choir book, and performed some of the pieces written in it on the Library's main staircase. Thanking the Library staff, their manager reflected, 'I don't think it's an understatement to say that it changed people's lives. Seeing and touching that

[66] Le Pape's notebook is featured in *The Prize Papers in 10 Photographs* exhibition https://materiality.prizepapers.de/exhibition/the-prize-papers-in-10-photographs (accessed 19 Aug 2024).

manuscript was meaningful for everyone on the course and they can't stop talking about it. It made the past feel alive and real.' (National Library of Scotland, 2020a, p. 20).

In his celebrated 1936 essay on the work of art in an age of mechanical reproduction, Walter Benjamin pondered what people gained or lost when they viewed, or listened to, copies of works of art reproduced via photography, film and other technical means. He proposed that what he called *aura* is rooted in the viewer perceiving the authenticity of an artefact as they observe material signs of its life history (e.g. patina) and its physical existence in time and space as a unique object (1999, p. 214). This aura, or *presence*, may elicit affective responses in viewers, a feeling of awe, perhaps, or distance, or sense of connection. Awe or wonder may be provoked by artefacts which are very old, display exceptional craftsmanship or which are associated with significant events or people, the Lindisfarne Gospels, for example, Govan Stones,[67] or Robert Burns' commonplace book. Curators play on this when they exhibit documents. Peter Lester (2018) described how expensively decorated French diplomatic agreements were displayed in spot-lit cases within a dim room, kindling within him 'a sense of resonance and awe from being in their presence'. He could imagine stroking their luxurious velvet bindings, but the documents were beyond touch behind glass. Awe, or tension between proximity and unattainability, can make the object feel distant. Intellectual distance from the artefact's world can also foster a sense of otherness, even if touch is possible (Dever, 2010, p. 167). Anyone can put their hand on the thousand-year-old hogback stones at Govan Old Church, but these carved representations of buildings are mystifying to most modern audiences. Reading room environments and protocols can foster, and may deliberately utilise, researchers' regard for archives to promote respectful handling (Evans, 2015; Sommer, 2020). Comparing past users' casual handling of a fourteenth-century manuscript by John Gower with the strict handling rules enforced by the Pierpont Morgan Library, Siân Echard remarked, 'One worships at the altar of the manuscript; one does not doodle on it.' (Echard, 2000, p. 189).

Nineteenth- and twentieth-century administrative, personal and business records rarely inspire awe because of their artistic beauty, nor do they feel distant. Audiences can relate to office paperwork and family correspondence more readily than eleventh-century chieftains' gravestones.[68] Pattern books charm and may surprise, but textiles are commonplace. Yet the visible signs of use, of a creator's hand or handiwork, convey their

[67] See www.thegovanstones.org.uk (accessed 19 Aug 2024).
[68] This may be true now, but perhaps for the born-digital generation, paper records of any period are ceasing to be part of their everyday lives and hence relatable.

authenticity. Permitted to handle these tangible manifestations of past lives, researchers can feel connected to the people and place they represent. The bundle of judicial papers Arlette Farge toiled through was repellent, 'worn out […] its corners eaten away by time and rodents'. But touching the pages made Farge feel that she was touching vestiges of the past (2013, pp. 2, 15). Leafing through a writer's notebooks, a researcher can feel they are looking over the shoulder of the writer (Sommer, 2020). Larkin called this their 'magical value', attributing the allure both to the handled paper and the glimpse into the moment of inspiration, made visible as the writer assembled subsequently oft-read words on the page for the first time (1983, p. 99). Historian Emily Robinson (2010) acknowledges that the affective experience of physically handling historical documents as part of the research process can shape the historian's thinking and sense of knowing about their subject. Archaeologist Stuart Jeffrey writes of 'the thrill of proximity' he experiences when holding an archaeological object, a thrill born of a sense of feeling connected to the people or events associated with the artefact, more so than proximity to the object itself (2015, p. 147). Textile designer Donna Claypool was permitted by Bolton Museum to undertake a 'controlled rummage'[69] through their holdings of textile archives in the store. Working through the boxes beside old looms and spinning wheels, she found the experience 'spine tingling' (Claypool, 2024).

Sometimes the connection can be sudden and visceral, an 'archival jolt' which brings the user up short. Ted Bishop unexpectedly encountered Virginia Woolf's suicide note among her papers in the British Library. While he had read the note's text many times in books and articles, touching the paper upon which Woolf's hand had inscribed the words swept away the gap between that moment and his present (Sommer, 2020). Michel Foucault struggled to rationalise how bureaucratic summaries of prisoners' cases, 'surgissant soudain à travers deux siècles et demi de silence' [surging suddenly across two and a half centuries of silence], generated intense, if fleeting, sensations of surprise and dread within him and shook him to the core (1977, pp. 12–13). Television presenter and journalist Jeremy Paxman received an archival jolt while discovering his family history through the BBC's *Who Do You Think You Are* programme. Known for his no-nonsense public persona as a political journalist, Paxman was moved to tears as he held and read death certificates documenting how his great-grandparents, Thomas and Mary Paxman, died

[69] The controlled rummage as a research methodology is explained in Bracey, A. and Maier, D. (2021) 'Controlled Rummage as Artistic Strategy: Exposing the Bummock of the Lace Archive', *TEXTILE*, 19(2), pp. 161–182.

from TB and exhaustion in their thirties.[70] Affective responses to records are not limited to the curated atmosphere of the searchroom. Jeremy Paxman read his ancestors' death certificates in a functional council office. Audiences respond to documents when they encounter them 'roaming free' (albeit carefully supervised) in community halls and classrooms. Teenagers connect to stories of young people like them as they cluster round a Victorian gaol register in their school classroom. Shoppers dropping into a local history day in their town hall are touched by a dog-eared letter sent by an eighteen-year-old son in Nevada in 1874 to his mother back home in Cornwall (Phillips, 2023). Connecting with local heritage can be powerful for individuals and communities. Those who have moved into, or away from, a community can establish a sense of belonging and forgotten or marginalised stories can be reclaimed (Jones *et al.*, 2018).

The textile industry had a huge impact on communities. Employment opportunities led to influxes of workers into localities. Renton, Catrine and other new villages were established by mill owners to house their workers. Manufacturers like the Crum family of Thornliebank and Clarks of Paisley built parks, schools and churches for the benefit of their workers and the community (Cooke, 2010, p. 74). Now many factories have closed, little record survives of those whose skill and labour made them successful. Sites have been eradicated, contributing to communities' loss of their history and sense of place (Historic Scotland, 2015, p. 9). Pattern books preserve traces of individual works and those employed there. They can connect modern audiences with these past workers, manufacturing the cloth in the workshops, and the environment in which they worked. Most of the colourists' notebooks which survive from Milton printworks are neatly set out, suggesting that they served as a reference copy, perhaps written up from rough notes. But a notebook from 1845 is different (Figure 20). Here, text has been annotated, inserted and scored out, quantities amended and calculations scribbled in odd corners. Blue, pink and green fingerprints and splashes of yellow and brown paste stain the pages. This notebook had evidently been kept at hand on the workshop floor, in close proximity to the printing tables, and it fosters an impression of a printer hastily leafing through the notebook to check a detail or jotting down a note as he worked.

[70] The episode aired on 11 January 2006: a clip of this section of the programme is available online www.youtube.com/watch?v=aMV7FKyMC88 (accessed 19 Aug 2024). Mr Paxman handled modern handwritten copy certificates, rather than the original registers.

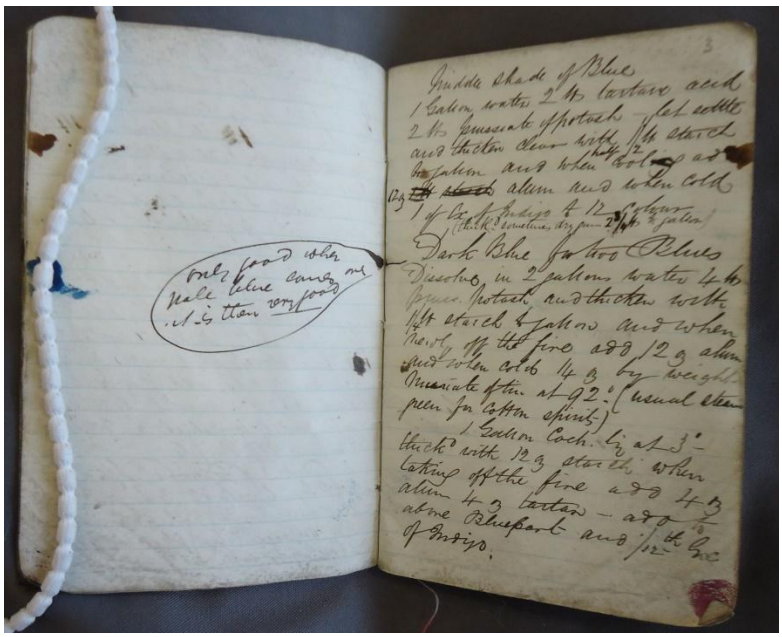


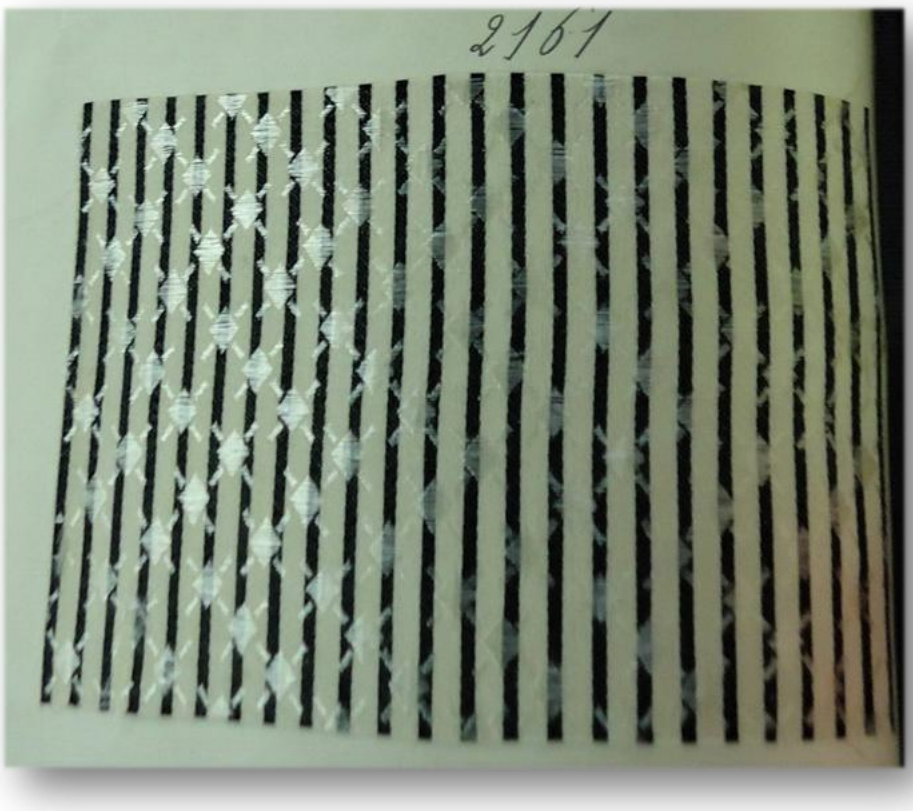
Figure 20. Notebook bearing pink-stained fingerprints and dye splashes, Milton printworks, 1845 (NLS MS.17987)

Conclusion

Catherine Richardson conceives of 'archives as repositories of productive environments of the past […] records of work done, of time spent.' Within them, she says, are found stories about making and about the spaces within which that making took place (Richardson, 2023, p. 248). On one level, pattern books are very literal repositories of manufacturing environments, documenting workers' creative endeavours and preserving the outcomes. But they also embody and convey stories of creative inspiration and making, the passing on of craft knowledge, of innovation and risk-taking, of hard work in hot, smelly and humid environments. The records help reconstruct the spaces in which those things happened, with their talk of looms, vats, garrets and drying fields. Pattern books are not alone in this. Architects' drawings, shipbuilding plans, writers' notebooks and medieval manuscripts similarly represent creative process and what is created. Users are increasingly engaging with the physical evidence of the making of documents and their use over time. They are drawing on the physical qualities of archives as inspiration for new creative expressions, in text, visual media and textiles. Physical interaction with these tangible representations of past lives and activities is fostering connections with place, community and personal stories. But archivists lack the theoretical and methodological tools to articulate records' materiality. Theory, because of its origins and subsequent influences, has focused on intellectual context, power and inclusion. Cataloguing standards are aligned with theory, meaning archivists who do want to document material

features struggle with incompatible standards and cataloguing systems. Archivists are acutely aware of the physical needs of their collections and instinctively employ their craft knowledge to appraise physical evidence, function and condition, but the academy does not offer a forum for discussion and theorisation of this facet of practice. However, there are encouraging signs of change. Archivists like Lester, Breakell and Russell are theorising archival materiality, publishing on it and demonstrating how it can inform cataloguing, interpretation and audience engagement intellectually and practically. The extent to which their ideas will be taken up by archivists remains to be seen.

Revealing



Cotton weavers David and John Anderson Limited were known for their smooth, crisp shirting and gingham fabrics and samples of these are plentiful in their 1890s pattern book. But samples in their pattern book demonstrate that their output extended beyond these staples to damask patterns and textured ribs and basketweaves. Thoughtful lighting or camera angles can accentuate a fabric's design. Side lighting on the sample above brings to life the white diamond design woven over the black and white stripes, while a high-resolution image enables viewers to magnify the image and scrutinise the weaving method.

Figure 21. Fabric sample from sample book, David & John Anderson Limited, 1890s (UGD022/8/1/2)

Chapter 4 Digital materiality and representation

The preceding chapter demonstrated the richness of the evidence embedded within documents' physical elements, and the way in which they are organised. For the archive service which wants to make that evidence accessible to online researchers, the question is how to do so. While digital objects are material entities, they cannot replicate how a paper document functions or the experience of interacting with it. In the digital environment, it is difficult to discern size, mass or texture. But thoughtfully chosen imaging and access approaches can highlight records' physical features and allow users to scrutinise digitised records to learn about the materiality of the original. This chapter examines the materiality of digital objects and infrastructure and looks at the affordances of digital tools for studying material characteristics of archives, especially pattern books. It concludes by thinking about representation and the relationship between the physical document and its digital version(s).

Digital objects and infrastructure

For some people, 'digital materiality' is an oxymoron. Digital objects appear to be intangible entities viewed on a screen or generated and manipulated through a keyboard, mouse, touchscreen or spoken commands. The internet seems to happen in the ether, especially when accessed using wireless technologies. In the early years of digital, electronic bits and bytes were 'popularly construed as intangible, invisible, ephemeral', while the specificities of digital objects were viewed as 'mysterious, arcane, and open only to the technologically initiated' (Shep, 2016, p. 323). From the 1980s, there was growing recognition that computing was distinctly material and media scholars like Friedrich Kittler developed theoretical models for describing its material substance (Casemajor, 2015). In the early 2000s, questions about the material nature of digital objects started to engage scholars in the Humanities, social sciences and information science (Shep, 2016).

Matthew Kirschenbaum defined two forms of digital materiality for computer systems: *formal* and *forensic*. As its name suggests, forensic materiality originates from the trace analysis of forensic science. Kirschenbaum (2012) demonstrates the numerous ways in which digital data leaves persistent traces on hard drives and registries, which can be detected and examined. Shep (2016) equates analysing these traces to the analyses carried out by book historians and bibliographers on the paper, ink and bindings of manuscript and print objects. Formal materiality refers to the structures of programming code and bits

(ones and zeros) which hardware and software process to initiate actions e.g. render an image on a screen for viewing (Kirschenbaum, 2012). Mats Dahlström, Katherine Hayles (2003) and Johanna Drucker (2013) defined a third type of digital materiality: *distributed materiality*. This describes the nature of a digital object as a dispersed assemblage of files, which electronic processes and hardware manipulate to enable the user to read the Word document or view the jpeg image.

An understanding of the material nature of digital objects and environments is helpful for managing and preserving born-digital archives and files generated by digitisation, an increasingly significant element of archivists' work. It is something which needs to be factored into digitisation programmes at the planning stage, to ensure there is a long-term strategy for storing, monitoring and actively preserving the large quantity of digital data which will be generated. Archivists involved in digitising collections and publishing them online also require at least a basic understanding of how image files are structured and what resolution describes. A typical digitisation workflow involves making copies of the master files, saving them in alternative formats and creating smaller-sized versions for publication. Resizing or resampling files and using lossy rather than lossless compression impact the quality of the image and hence the viewer's experience and what use they can make of the published version. But archivists seeking to communicate records as artefacts in the digital sphere need to look beyond forensic traces and checksums. Instead, they would do well to consider the *affordances* of the digital environment, that is, what use can be made of digital tools to render physical features visible and readable.

Affordances

The term *affordances* refers to what one entity offers or provides to another and was formulated by perceptual psychologist James Gibson in 1979. Gibson (2014) explained that, while the physical attributes of an object are constant (paper is always paper), what use the object is to any one person or animal depends on their individual perspective and requirements. A bush offers a blackbird a place to build a nest; for a deer, it might provide lunch. A dye recipe book without fabric samples may be useful to a researcher tracking the use of peachwood as an ingredient, but useless to another who wants to compare hues produced by recipes containing peachwood. Following Gibson, Paul Leonardi (2010) concluded that, in human-object relationships, 'what matters most about an artifact is not what it's made out of, but what it allows people to do'. Consequently, Leonardi reasoned, the usefulness of digital artefacts within organisations depends on how successfully they

translate ideas into practice, what actions their form and features support, and whether their capabilities are relevant to users. A particular affordance of digital objects and technologies is that they enable users to harness computers' processing capabilities to analyse objects and data in ways that are not possible or readily achievable manually (Prescott and Hughes, 2018; Endres, 2019, p. 8).

The most commonly cited affordances, or benefits, of digitisation programmes are document preservation and increased access (Prescott and Hughes, 2018). Digitised documents which are freely available online allow audiences to access the records at a time of day and in a location convenient to them, and address the cost of travel to the repository. Audiences can enjoy and study documents where access to the original is restricted, due to the nature or condition of the document or the institution which holds it; this is particularly relevant for literary medieval codices, but applies to modern records as well. Heavily-used sources like parish registers, tithe maps and university matriculation registers have been withdrawn from public use in many repositories because they have been damaged by over-handling. Digitisation maintains access to their content while protecting the physical objects. It also assists researchers studying organisations and individuals whose records are dispersed between multiple institutions, the situation with a number of textile company archives, due to company amalgamations and storage issues in archives. For example, the HMC's guide to holdings of textile company archives lists forty-three textile printing firms; the records for just over half these firms are divided between two or more repositories (Royal Commission on Historical Manuscripts, 1990). William Wilson & Son, tartan manufacturers of Bannockburn, made a significant contribution to the development of tartan as a commodity and their work is central to its study. But the company's records are dispersed between multiple public and private archives, hindering their use and research in this field (Tuckett, 2016): digitisation could assist with access and comparison of data.

While access to content is important, digitised versions of documents can showcase records as artefacts and enable audiences to interrogate the evidence their material features contain. For archivists evaluating collections for digitisation, considering how imaging and digital tools could enhance access to the artefactual elements of records would provide richer and more useful digital resources for audiences. Visual options range from still photography to machine vision and augmented reality. Textual representations can describe material features which cannot be communicated visually and support data analysis. Heritage science tools reveal information about materials and usage. Of course,

for many institutions, applications of advanced technologies will be limited to funded, researcher-led projects. But straightforward methods can produce rich data and lay the foundation for advanced analyses, if a material-centred approach is adopted from the start. Prescott and Hughes envisage digitisation as 'a constantly expanding toolbox for probing and analyzing manuscripts that goes beyond simple colour imaging' (2018, para. 4). Dot Porter (2022), too, urges custodians to be creative in their digitisation and generate outputs that go beyond a simple copy. She asks, 'If a digitized manuscript isn't a manuscript, how can we present it in ways that explore aspects of the original's manuscript-ness, ethically and with care, while both pushing and respecting the boundaries of technology?' (Porter, 2018). Porter's challenge is explored below.

Digital capture

Standard imaging

Flat-lit, overhead, still photography with a digital camera, or scanning, are the most common methods employed by archives and libraries to digitise documents, volumes, maps and drawings. Their effectiveness in facilitating study of physical attributes of records should not be underestimated. As Bill Endres observed,

> much of the focus of digital imaging has been on producing visual representations and increasing access. This is no trivial accomplishment […] Access and a simple tool, such as magnification, can lead to wondrous insight and revelation. (Endres, 2019, p. 2)

Capturing content is usually the primary goal and shots explicitly placing that content in its physical context by showing the document's form and structure are often absent (Eden, Jirotka and Meyer, 2012). But overhead photography can also take views which show physical elements. It is becoming standard practice in manuscript and rare book digitisation to photograph the spine, covers inside and out, and flyleaves (Paul, 2020).[71] This practice could be emulated for other volume digitisation, including pattern books. A volume's spine may carry information which aids interpretation of the contents. An 1830s colourists' notebook from Milton printworks has '2' tooled in gold on the spine (NLS MS.17992). Showing users that this notebook is the second volume in a set helps them to

[71] NLS images covers, flyleaves and blank pages but not spines, as this would involve adjusting the cradle, incompatible with their rapid-throughput digitisation model.

make sense of the page numbering, which starts at p.170, and the index, which references page numbers not present within MS.17992. Inside covers and flyleaves may carry useful information about past ownership. Students participating in the Jesuit Libraries Provenance Project discovered that flyleaves of books donated to the library of St. Ignatius College (now Loyola University, Chicago) in the nineteenth century bore bookplates, inscriptions and stamps, documenting their career prior to donation. One inscription testified to a copy of von Ranke's *Lives of the Popes* being looted from the Reverend Harrold during the American Civil War. When this information was posted online, descendants of one John Morrison came forward and shared diary entries in which Morrison recounted how he had taken the book (Roberts, 2016). Imaging form is not limited to bound items. Documents which live folded or rolled – factory site leases and loom patterns, for example - could be photographed in their closed state, allowing researchers to see how they were curated and stored by past owners.

There are tools for documenting size and colour during digitisation. A scale (ruler) placed in shot provides a visual reference to a document's size and can amplify dimensions listed in the description, or substitute for them. A hand in shot offers a relatable, if less scientific, indicator of size (Green, 2018). Scale in digital photographs is of great importance to historian Joanne Tucker. She always includes a reference point when photographing documents in the searchroom, her hand, for example, or mobile phone (Tucker, meeting, 2021). The Ausberg Textile and Industrial Museum has digitised its collection of calico pattern books and presents the individual samples detached from their page context. To contextualise the size of the samples, each is accompanied by a scaled photograph of an everyday object, such as a paperclip, clothes peg or pencil sharpener.[72] Capturing colour photographically has always been tricky, as the appearance of colours on physical objects depends on the type of light present. Light from a south-facing window has a different colour and intensity to fluorescent lighting, for example, influencing physical viewing and what camera sensors perceive. The muslin curtaining below (Figure 22) was photographed with a Sony digital camera, then a smartphone camera. The photographs were taken seconds apart in a windowless room and demonstrate how camera sensors do not discern colours uniformly.[73] For digitisation, camera settings can be calibrated so that the camera perceives the light present as white or neutral. Incorporating a coloured target in shot enables images to be colour-corrected retrospectively and

[72] Ausberg Museum's Calico portal https://calico.timbayern.de/entdecken (accessed 19 Aug 2024).
[73] The colour captured by the smartphone approximates the shade the author discerned.

monitors and other viewing devices to be calibrated, so they render the colours more accurately (Rekrut, 2014; Howell and Snijders, 2020, chap. 4).

Figure 22. Orange muslin as seen by Sony camera (L) and smartphone camera (R)

Standard overhead document photography uses diffused lighting, where possible, to avoid creating shadows (Endres, 2019, p. 33). Shining a light at a low, raking angle across the page brings page characteristics into view. When the *Exeter Book Project* team digitised the Exeter Book, they fitted a light to the side of their camera stand to take images under raking light. These side-lit images made visible illustrations inscribed on the parchment in drypoint, including the head and wings of an angel and a decorated letter P (Mills, 2017; Exeter Cathedral Library and Archives and University of Exeter Digital Humanities Lab, 2021).[74] Raking light highlights the imprint of type pressed into paper or contours of a wrinkled page (MacLean, 2022). Taking images at a raking angle similarly brings more features into view. A side view of a Milton printworks voucher book (Figure 23) allows the digital viewer to see how the loss of its binding has caused the unsupported spine to

[74] The Exeter Book is an anthology of Old English poetry, written down c.970. The book was donated to Exeter Cathedral in the eleventh century. Drypoint markings were made with a stylus or similar instrument, without ink, so they would be barely visible on the finished page.

curl round, transforming the shape of the volume to the detriment of the vouchers pasted within. The slivers of cream paper show where vouchers are spilling out.

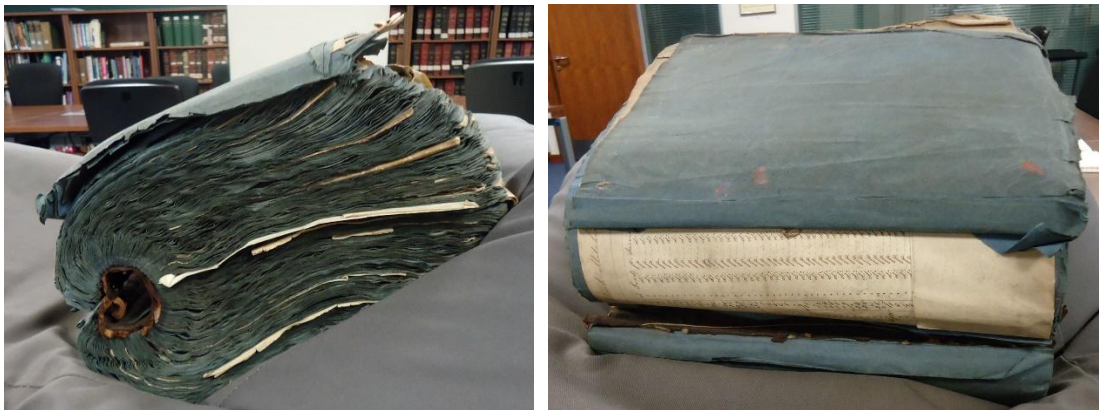


Figure 23. Distorted voucher book, Milton printworks, 1828-1831 (ASC DC90/7/1/7).

Imaging textiles under raking light or at a low angle foregrounds textures and weaving. It accentuates patterns woven into damasks and brocades, ridges on ribbed cloth and knobbles on textured wool fabrics (Figure 24). It highlights the sheen on silk or moiré ottoman (Figure 25) and demonstrates how metallized jacquards are designed to catch the light and change appearance as the wearer moves (Figure 26). For researchers, the appearance and texture of a fabric's surface can indicate what fibres it incorporates, how it was manufactured, and how it might feel to wear. Providing access to this information digitally allows researchers to assess records and samples, conduct research remotely and identify documents for in-person study.

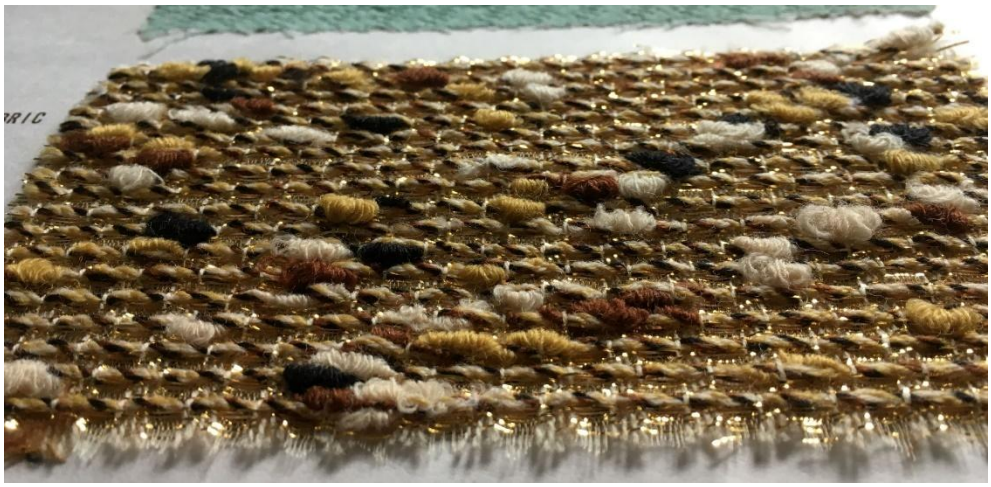


Figure 24. View of textured knopped silk/wool fabric, Bilbille & Co., 1968 (private collection)

Figure 25. Sheen and ribbing on satin-striped moiré ottoman, Bilbille & Co., 1968

Figure 26. Metallized matelassé jacquard catching the light, Bilbille & Co., 1968

Just as it is useful to take all sides of volumes and documents to illustrate their construction and form, capturing the reverse of a textile allows audiences to see the evidence it carries about its manufacture. While this is not possible with samples glued into pattern books, it can be done with detached samples or standalone textiles. The Glasgow School of Art has digitised the reverse of the textiles in its collections and taken angled views of surfaces (Kaye, 2023). Their digitisation of a 1950s tapestry by Marion Stewart (GSA NMC/1587) included an angled view of the front, which brings out the texture of the wool yarns. An image of the reverse enables viewers to see where Stewart decided to carry the yarn from one area to another, rather than cutting and restarting it. The reverse of a length of muslin curtaining (Figure 27) shows that it was non-reversible. Purchasers therefore had to decide whether the right side should face into the interior, making the room look well-dressed, or

face the street for kerb appeal, forcing the occupants to look at the less attractive reverse. Zooming in digitally shows details of the fabric's manufacture (Figure 28).

Figure 27. Front and reverse of muslin curtaining, David Ligat & Sons Ltd. (ASC UGD093/1/8)

Figure 28. Detail of reverse, showing manufacturing evidence (ASC UGD093/1/8)

Advanced imaging

Overhead and raking angle/light photography can effectively capture a record's content, construction and materials. More advanced digitisation technologies can bring to light new information about material features and user interactions, and also provide valuable data about records' condition, to support their ongoing preservation. Custodians and researchers working with ancient and medieval documents have championed new analogue and digital technologies for many decades, as have archaeologists, but they are proving beneficial for textile heritage as well. Reflectance transformation imaging (RTI) extends the technique of imaging under raking light and angles. It involves taking somewhere between twenty-four and sixty photographs[75] of one page, changing the angle of the lighting for each shot. The images are combined into a single file and computer processing enhances surface details. When the processed file is viewed through a RTI viewer, the user can modify the way the page is lit. Applied to medieval manuscripts, RTI reveals drypoint writing and rulings, can emulate the play of candlelight over the surface and identify lifting pigments and inks (Endres, 2019, chap. 2). While pattern books do not contain features like these, the National Archives (TNA) has experimented with Polynomial Texture Mapping (PTM), an application of RTI, on Board of Trade design copyright registers, to foreground artefact textures (TNA BT 42-BT 53). Under the Design Copyright Act 1839 and subsequent legislation, design owners could register their copyright in the ornamental design of manufactured goods (in metal, wood, glass, earthenware and textiles), and designs on wallpaper, printed and woven fabrics, lace and carpeting (The National Archives UK, 2021), by submitting drawings, photographs, wallpaper and fabric samples, and even objects. The Board pasted the paperwork and samples into representation registers. These registers are large, heavy and unwieldy, and folded and bulky samples within them fragile after a century of compression. TNA wanted digitisation to capture their 'character-defining features', especially texture, and 'convey the material and visual excitement' of the sample artefacts (Eastop, 2012, p. 42). According to Eastop, PTM imaging was successfully trialled on chintz, knitted silk gloves and basketwork, its multi-angled lighting highlighting materials and the construction of the items (Eastop, 2013a, 2016).[76]

[75] Endres (2019, p. 35) recommends about forty-five images per page for manuscripts, although he has achieved satisfactory results with twenty.

[76] The PTM files are no longer available publicly, so it is not possible to assess the outcomes.

Studying documents under light spectrums beyond those to which human eyes are sensitive, typically ultraviolet and infra-red, can aid reading, as the light spectrums enhance the inks, and reveal otherwise indiscernible features. By the 1930s, photography under ultraviolet and other light spectrums was taking place to read faded or damaged manuscripts (Echard and Prescott, 2020, p. 258). Digital photography coupled with computer processing has extended the power of these techniques. For example, damaged pages of the Beowulf manuscript[77] were photographed under ultraviolet lighting; when the digital images were manipulated with imaging software, clear images of the text emerged (Prescott, 1998). Multispectral imaging captures six to thirteen bands of light reflected by a page at specific frequencies for ultraviolet, blue, green, yellow, orange, red and infra-red, while hyperspectral imaging can divide the reflected light spectrum into anything from twenty to over three hundred bands (Endres, 2019, pp. 8–9). The V&A used these two techniques to examine painted designs for woven silk in designer James Leman's pattern book. Multispectral imaging revealed preparatory pencil sketches underneath the painted designs, showing how Leman modified details during the design process. Meanwhile, hyperspectral imaging identified areas of the finished designs which had been painted with the same pigment, for instance, lead white (Burgio, 2017b).

These straightforward and advanced still imaging approaches are successfully bringing physical elements of records to audiences' attention. The cultural heritage sector is also embracing technologies which concentrate on the three-dimensional nature of archives, artefacts and built heritage, including filming and 3D modelling. Certain techniques are well-suited to documentary heritage. Others offer potential for exploring textile heritage artefacts, like shuttles or looms, former manufacturing sites or even entire mill towns and the infrastructure that served them. There are opportunities to virtually recreate sites which have been demolished or repurposed and situate existing artefacts, including records, within them. Filming documents is straightforward and accessible for most custodians, especially since many mobile phones record video, and would work well for showcasing pattern books and other textile archives. As the ASC case study explores (chapter 5), filming a person handling a document allows the viewer to see not just what the document is, but also how it functions and the experience of interacting with it. It can show the sequence in which a factory lease is unfolded or how reluctant loom set-up plans are to lie unrolled. Gently raising and lowering a page of shot taffeta samples can illustrate how the

[77] The vellum manuscript contains a poem about the Scandinavian hero Beowulf, written down in Old English c.1000 AD. British Library Cotton MS Vitellius A.xv.

weave and fibres were designed to play with the effect of light on their surface. If there is a microphone, the sounds the paper or bindings make as they move can be shared. A commentary enables the contributor to describe material features which are not visible, smell or texture, perhaps.[78] Film-maker Anna Brass filmed a TNA volunteer working on a Board of Trade representation register (*The Volunteer Experience*, 2013). The film 'evokes the rhythm and repetition of page-turning, and of unfolding and refolding designs; it is not a documentary but an attempt to present texture in both image and sound' (Eastop, 2013b). The viewer hears the swish when the register's sturdy paper pages are turned, followed by the rattle of stiff tracing paper being unfolded. They see the give in a square of floppy blue and white fabric and the stiffness of a crisp, yellow, sunburst textile.

360-degree imaging, or 'spin photography' as it is also known, builds a dynamic representation of an artefact from a set of still images. The camera is fixed in one spot and the artefact placed on a turntable. The turntable is rotated by a measured number of degrees and an image is taken; this is repeated until 360 degrees is completed. The number of degrees between photographs depends on the density of coverage required, but the images must overlap so there are no gaps in the model. Software stitches the images together and generates a 3D model which the viewer can rotate and magnify. As discussed in chapter 5, Sunny Bank Mills has captured a selection of artefacts, textiles and documents using 360-degree photography. Some items are captured in two states, for example, viewers can examine a guard book (type of pattern book) closed or open at a fixed page. A cash book does not rotate; instead, every tenth page has been photographed and the viewer can click through the selected pages, akin to 'turning the page' applications, and get a flavour of the contents. Sunny Bank Mills has also used 360-degree photography to create interactive views of spaces within the former mills.[79] Photogrammetry, too, starts with overlapping photographs of an object, but uses them to mathematically construct a 3D model, which viewers can examine from many angles. Software aligns the photographs and estimates the position of the camera relative to the object for each shot. This positional data is used to generate a three-dimensional point cloud and, ultimately, the geometric model. The model's surface appearance is derived from the photographs. Photogrammetry is good at representing colours but copes less well with shiny surfaces. In

[78] UofG academics and ASC staff have created teaching videos showing staff handling documents, with and without a commentary. During The Schoenberg Institute for Manuscript Studies' weekly *Coffee with a Codex* online talks, curators turn through the chosen manuscript, pointing out physical features and interesting content, see www.library.upenn.edu/events/coffee-codex (accessed 19 Aug 2024).

[79] See www.sunnybankmills.co.uk/online-archive and www.sunnybankmills.co.uk/heritage/the-press-360 (accessed 19 Aug 2024).

heritage organisations, it is popular for audience engagement and useful for monitoring the condition of museum artefacts and archaeological sites (Howell and Snijders, 2020, pp. 155–157; Atkinson, 2022), as the tools are readily available;[80] Sunny Bank Mills' workshop participants created 3D models of objects using a photogrammetry application on an iPhone (Moaby, 2022). Laser scanning uses laser beams to measure the physical characteristics of the subject's surfaces. Data is collected from thousands of points and processed to build a 3D model. In heritage, the technique is most often used in archaeology to model buildings and sites. Architectural historian Andrew Tallon laser-scanned the Cathedral of Notre Dame to study the structure and techniques used in its construction; his scans have proved invaluable in the restoration of the fire-damaged cathedral (Kenney, 2019). LiDAR (Light Detection And Ranging) uses laser technology to survey sites and landscapes from above. Photogrammetry could be used to model textile artefacts, while laser scanning and LiDAR could be applied to textile manufacturing buildings, sites and their surrounding landscapes.

Heritage institutions are embracing 3D modelling to create immersive, augmented and virtual reality experiences and enhance audience engagement within museums, on archaeological sites or from home. They can portray an object or site in multiple physical states, actual and interpolated, or provide visitors with supplementary information during their visit.[81] Technology can connect audiences with heritage which is inaccessible or lost. Sunny Bank Mills photographed the interior of site buildings earmarked for demolition and built 3D models of them, allowing visitors to continue to engage with these spaces through virtual reality headsets (Moaby, 2022). HMS *Royal Oak* was torpedoed in Scapa Flow harbour on 14 October 1939 and sank. Now lying 32m under the waves, public access is restricted by the ship's location and its designation as a war grave. The *Fallen Oak* project team took thousands of images of the submerged vessel and processed them with photogrammetry tools to build a 3D model. Additional still images and video footage captured the atmosphere and setting of the wreck. The team combined these resources to create an immersive representation of the ship, enabling members of the public on Orkney to view and explore the ship for themselves via virtual reality headsets, a moving experience for elder Orcadians who witnessed the sinking (*Fallen Oak: Revealing the wreck of HMS Royal Oak*, 2020). Humanities scholar Bill Endres is an advocate for

[80] For example, Historic Environment Scotland refers to its 3D model of Skara Brae to monitor how the coastline is changing and uses that information to inform site management (Atkinson, 2022).
[81] Historic Environment Scotland uses immersive technologies to provide site visitors with access to archives relating to that site or images of artefacts found within it (Mirashrafi, 2021).

building immersive VR environments within which to study medieval manuscripts. He explains that they would allow researchers to view a manuscript at any angle, free from scroll bars and a mouse; measure dimensions more accurately; compare manuscripts with artefacts; add a IIIF (International Image Interoperability Framework)[82] viewer to overlay material; and perhaps even facilitate voice recognition transcription. Most importantly, he believes that restoring the three-dimensional nature of the manuscript to the digital encounter would foster the sense of wonder the physical artefact possesses (Endres, 2019, chap. 5). Whether Endres' vision comes to pass for textile records, immersive technologies can certainly situate textile records, artefacts, machinery and fabrics within their former working context, both for extant sites and those long gone. They offer ways for local communities to reconnect with, and evaluate, the industry whose factories, infrastructure, housing and amenities physically shaped their locality, whose need for labour provided comprehensive employment, and whose departure had severe economic consequences which remain real today.

Digital tools

Tools for all

The advanced imaging techniques described above require access to the necessary equipment, expertise and resources to implement them and will not be deliverable for many GLAM institutions. But as Endres said, researchers can use standard overhead images for quality research by applying any of a plethora of digital tools and applications. Magnifying an image to obtain a clearer view of a hard-to-read word, weaving technique or yarn twist shape can simply but effectively resolve queries. A magnifying glass has been part of many researchers' toolkit for decades. Digital magnification does not just replicate this; it is, in the view of one of the project survey's respondents, more effective. It also allows researchers to immerse themselves in the nuances of script or colour and brings to their awareness elements easily overlooked with more distant viewing (Turner, 2021). Changing the contrast level in photographs of medieval music manuscripts reveals otherwise invisible erasure marks (Eden, Jirotka and Meyer, 2012, p. 75). Recurring words can be digitally cropped from one or several digitised documents, pasted into a Word document and compared and analysed (Lit, 2020, p. 107). Perhaps ironically in the context

[82] Image-based resources, such as scanned archives, are important for research but are often siloed within digital repositories, as access depends on local software. The IIIF initiative is developing standards and technologies that facilitate interoperability and enhance access, see https://iiif.io/ (accessed 25 Aug 2024).

of this discussion about the importance of the physical artefact, digital versions of records can tame the overwhelming and challenging physicality of some record forms and offer them in a more manageable format. Digitised versions of the complexly stitched and rolled Pipe Rolls are easier to work with than the originals. They certainly simplify the task of comparing data recorded in multiple sections of a roll, a slow task physically, and one which would subject the document to intensive handling.[83]

Advanced digital tools

Just as advanced imaging technologies offer fresh insights into documentary heritage, applications employing computer vision and machine learning harness computers' large-scale data processing capabilities to interrogate document features. As discussed in chapter 3, museums and galleries have used computer vision to determine the dominant colours in works of art, textiles, ceramics and other artefacts, and have incorporated colour searching into online catalogues (Trivedi, 2019). The NHM case study explains how the museum uses it to read specimen labels (Smith, 2022, see chapter 5). Computer vision is being applied to match images. Seventeenth-century printed ballad song sheets were frequently illustrated with woodcut illustrations. Given the cheap, ephemeral nature of these publications, printers reused their woodcut blocks, forming a repertoire of stock images. Giles Bergel and colleagues in the Visual Geometry Group at the University of Oxford developed an image-matching tool implementing computer vision technology. The tool automatically extracts images from song sheets, clusters similar images and analyses pixel consistency and other data to match up images which were probably printed using the same woodblock (Chung, 2014). Bergel has extended this technique to woodcuts in chapbooks (small, cheap books sold by travelling pedlars in the eighteenth and nineteenth centuries), with a view to identifying their place of publication and the relationships between printers, publishers, distributors and audiences (National Library of Scotland, 2020c).[84]

Back in 1999, before digitisation had even become commonplace in cultural heritage institutions, Philip Sykas perceived that image recognition technology held great potential for textile heritage research. He was particularly interested in computers' ability to compare designs shown in digitised textile samples with those visible in images of

[83] Digitised Pipe Rolls are on the Anglo-American Legal Tradition website aalt.law.uh.edu/AALT.html (accessed 19 Aug 2024).
[84] Image matching has been implemented in the Broadside Ballads Online database http://ballads.bodleian.ox.ac.uk/ (accessed 19 Aug 2024).

museum clothing, depicted on fashion plates and seen on garments worn by subjects in historic photographs. Sykas could see that this could aid researchers to identify instances where a fabric had been brought into production, marketed and made into garments or furnishings (Sykas, 1999). The *Deep Discoveries* project team (2020-2021) employed the concept of image matching to build a user interface based on computer vision search technology, to allow users to search digitised heritage collections at scale using visual criteria rather than keywords. Users initiate a search with a visual prompt, for example, by uploading their own photograph, or selecting one from the site database. In response, the system retrieves all instances which correspond visually in shape, colour and pattern, regardless of the media. The team wanted users to be able to refine the search results visually, by indicating to the tool the areas on the retrieved images which corresponded with their query. As they wanted to be transparent about how the tool was making decisions, results were represented diagrammatically, highlighting the elements of each image which the search tool perceived as a match to the query, but users struggled to understand what the diagrams were showing, where the similarities lay and how to refine the results. The prototype worked better with targeted searches, rather than random browsing. Good metadata was important to the tool's operation, as users wanted to combine visual and textual searching, for example, by filtering visual search results by date, and required data about each image's context, provenance and location (Angelova, Collomosse, *et al.*, 2021; Angelova, Ogden, *et al.*, 2021).[85]

Machine vision and machine learning technologies are also being applied to read and extract text within historic documents. Optical character recognition (OCR) software effectively extracts printed texts in Roman type, but works less well on other character sets, early typefaces and historic handwritten text. University College London Library ran a project to digitise their collection of Jewish pamphlets and extract texts written in Hebrew, Yiddish, French, German and English using OCR, but the machine-readable output was poor quality for the texts printed in Hebrew, Yiddish, Gothic and early scripts (Watson and Freedman, 2023). However, artificial intelligence-based (AI) transcription software like Transkribus is yielding useful results, recognising text written right to left or laid out in multiple directions on the page. The University of Edinburgh developed a Transkribus model to extract text from handwritten, multi-lingual geology fieldwork notebooks compiled by scientist Charles Lyell (1797-1875) and others. They found it

[85] Deep Discoveries https://tanc-ahrc.github.io/DeepDiscoveries/index.html. For a demonstration of the platform, see www.youtube.com/watch?v=gEuU_zf223g (accessed 19 Aug 2024).

coped well with geological terminology, even redundant words, and diagrams (McIntyre and Rodger, 2023). However, researchers transcribing naturalist Thomas Pennant's printed journals as part of the *Curious Travellers* project found the software struggled with italic type, the long 's', indented text and abbreviations (Guariento, 2023).[86] It would be interesting to see what handwritten text recognition tools make of dye recipe books and colourists' notebooks. Their sector-specific references, redundant terminology and abbreviations might be barriers. Also, there may be insufficient records in one hand to train the software and build a model. Crowdsourcing transcripts may therefore be preferable, a topic which is explored in the institutional case studies (chapter 5).[87]

Numerous cultural heritage projects are exploring the possibilities and capabilities of AI-based tools to improve access to collections and extract data from them for research and analysis. *Towards a National Collection* is the umbrella for several projects testing machine learning and computational analysis tools: projects include *The Congruence Engine*, connecting collections held in different locations; *Heritage Connector*, which is transforming museums' catalogue data into machine-processible data; and *Our Heritage, Our Stories*, making community-generated digital content more discoverable and accessible. The *Living with Machines* project examined the efficacy of machine learning, natural language processing and large language models to extract and analyse visual and textual data from digitised cultural heritage collections, especially maps and newspapers (Living with machines, 2023; Ridge, 2023).[88] The National Archives is exploring the capabilities of AI technologies to appraise and sensitivity-review large collections of complex digital data, automate metadata creation and facilitate computational analysis of collections (Goudarouli, 2023). Heritage organisations have built AI-based tools to facilitate cataloguing. For example, the National Library of Finland used machine learning and natural language processing to build *Annif*, which provides automated subject indexing and classification; Carnegie Mellon University Libraries created a computer vision tool to helps its librarians find and tag images depicting similar scenes in the university's digital photograph collections (Enis, 2021).[89] Unsurprisingly, it is mainly larger organisations

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[86] *Curious Travellers* project, https://curioustravellers.ac.uk/en/ (accessed 25 Aug 2024).

[87] By way of experiment, I ran one page each from three Milton printworks colourists' notebooks through the Transkribus English Handwriting M3 public model. The transcripts required extensive editing. The model struggled with fractions, long descenders and abbreviations.

[88] Led by the British Library and The Alan Turing Institute, 2018-2023. Work included training the technology to recognise railway infrastructure on maps and extract place names, https://livingwithmachines.ac.uk/.

[89] *Towards a National Collection* www.nationalcollection.org.uk. Annif https://annif.org. (accessed 19 Aug 2024).

with access to the requisite resources and skills who are currently trialling these tools. But some smaller organisations are experimenting too. The Britten-Pears Foundation tested whether AI could trace connections between records in the Britten archive and archives held elsewhere, for example, the Royal Opera House. This revealed an extensive network of people, especially female organisers, linking Britten, other artists and arts organisations together (Adams, 2024b). While the use of AI-based tools will no doubt grow within the heritage sector, and potentially enhance access to textile heritage, this project focuses on established technologies currently within reach of Humanities researchers and the majority of heritage institutions.

It is important to acknowledge here that using advanced technologies to model and analyse heritage collections raises ethical questions about the amount of interpretation employed, how to balance accuracy with audience experience, and how to transparently share what is known and what is informed guesswork (Jeffrey, 2015; Opitz, 2021). AI algorithms and models reflect the biases in their underlying data and lack transparency about how they reached their outcome (Goudarouli, 2023). The heritage sector is attempting to address these concerns. The *London Charter for Computer-Based Visualisation of Cultural Heritage* presents principles for creating visualisations that have technical and intellectual rigour and provide sufficient information about their sources, construction and level of interpretation for audiences to evaluate them (Beacham, 2008). The *Museums + AI Network* brought together museum professionals and academics to critically reflect on the use of AI methods in museum contexts; the network's toolkit guides museum professionals on the ethical application of AI tools for visitor engagement, collections access and audience analytics (Villaespesa and Murphy, 2020).

Description

Whatever tools are employed to create digital versions of records, metadata is essential to explain what they represent, put them in context and aid discovery. But textual description, whether accompanying digital images or functioning alone, is valuable in its own right. It can describe features which cannot be discerned visually in images, like weight, smell or thickness of paper (Campagnolo, 2020, p. 2). Describing physical features in words e.g. 'linen', 'printed', enables users to search for these elements and identify records relevant to their research. Words can convey complex structural information, evidenced in the highly detailed descriptions of medieval manuscripts. Velios and Pickwoad describe cataloguing as a form of digitisation. They devised a hierarchical

glossary for recording structured descriptions of bookbindings in XML, a machine-readable format which allows the data to be processed and manipulated for analysis and supports multi-lingual descriptions and searches (Velios and Pickwoad, 2012).

When structured catalogue data is made available to researchers for machine processing and analysis, it opens up avenues for research, including into materiality. The VisColl (Collation Visualization) system developed by The Schoenberg Institute transfers standardised collation metadata for medieval manuscript codices into XML and generates diagrams and formulae depicting the structure of their gatherings. The Institute is incorporating collation visualisations into its catalogue records ('Collation', 2020).[90] The Natural History Museum makes its insect specimen metadata available in structured datasets for scientists to download, aggregate and interrogate, building knowledge about species distribution over time (Smith, 2022). Furthermore, the NLS's Data Foundry publishes collections data in several machine-readable formats, including metadata about collections and place-name data extracted from maps.[91] The *Tudor Networks of Power* project took digital metadata for c.124,000 letters in the Tudor Government's State Papers, dated 1509-1603. Adding linked data and georeferences enabled the team to construct a visualisation showing who was corresponding with who, which revealed complex, international communications networks, as well as surprising connections between individuals.[92] Converting Loyola University's nineteenth-century library catalogue into structured digital data permitted researchers to study the library's holdings and generate new knowledge about past curricula and pedagogy (Roberts, 2016).

As the examples above demonstrate, turning metadata about archives, or information residing within them, into structured data, either manually or by applying AI-based technologies, can facilitate new avenues of research that would otherwise have been difficult or excessively time-consuming for researchers to undertake. At present, this type of work is mainly limited to funded, researcher-led projects or a small subset of heritage organisations, like the NLS and British Library, which have identified it as a core function and have established teams to deliver it. For most archive repositories, creating datasets like these is not a priority. They need to appraise and catalogue records and retro-convert or review older finding aids, or they do not have the equipment, skills or staff time to deliver such work, and their core audiences are not asking for structured data. But it is

[90] See https://viscoll.org (accessed 19 Aug 2024).
[91] Data foundry https://data.nls.uk (accessed 19 Aug 2024).
[92] See https://tudornetworks.net (accessed 19 Aug 2024).

important for archivists to be aware of future possibilities for interrogating their collections metadata and digitised records, and try and ensure that the way they structure and digitise their records today does not preclude any future reuse. There are also avenues which are potentially deliverable for many repositories today and which are helpful for researchers interested in undertaking this type of analysis. For example, offering researchers the option to download an archive catalogue from the repository website as a .csv file and not just as a Word or pdf file provides them with structured data which they can manipulate and analyse (Wiggins, 2023b).

Heritage Science

The field of heritage science is also harnessing the power of digital tools and computer processing to delve into physical cultural heritage artefacts. As the literature review in chapter 1 showed, scientific analysis affords new insights into the creation and careers of manuscripts, records and textiles, including pattern books and their samples, by identifying the composition and origins of the materials from which they are formed and studying evidence of usage, custodianship (or lack thereof), and even traces of users themselves. Its findings deepen understanding of historical processes and workers' expertise and supports collection conservation. As with imaging, some scientific techniques, like microscopy, have a long analogue history and their digital versions combine established methods with the enhanced functionality digital tools provide. Non-invasive technologies (such as spectroscopy) are useful for studying cultural heritage objects, but may not produce clear-cut results when dyes, pigments and textiles contain blended components. Invasive chemical analyses, which entail removing a fragment of material for analysis (for example, a thread or pigment flake), separate out the sample's components, thereby producing clearer readings, but the sample is destroyed in the process and the integrity of the object altered, meaning these invasive techniques are not always appropriate. Which method to use has to be decided on a case by case basis, depending on the object being studied and what information is sought for what purposes (Quye, 2020). The tools available to heritage scientists are numerous, so this section concentrates on methods which are revealing new knowledge about textile heritage, or have the potential to do so in the future, namely spectroscopy, p-XRF and chromatography.

Spectroscopy involves exposing a point on the material under investigation to electromagnetic radiation at defined wavelengths. The instrument compares the radiation emitted with that absorbed or scattered (reflected) by the material and produces a graph

(spectrum) representing this pattern of absorption and reflectance. Each substance produces a signature spectrum, which can be looked up in spectra classification reference libraries, enabling substances to be quickly identified. Spectroscopy can be used on artefacts or extracted specimens. Fibre Optic Reflectance Spectroscopy (FORS), based on broad spectrum light and fibre optic cables, and Fourier-Transform Infra-Red Spectroscopy (FTIR) are widely used to analyse manuscripts, paintings and textiles, as they are straightforward to apply and portable devices are available. FORS can distinguish various textile fibres and identify classes of natural dyes with different absorption spectra, e.g. red dyes obtained from insects versus from the plant safflower (Howell and Snijders, 2020, chap. 5; Laursen, 2020). FTIR works on pigments, dyes, gum, glues, proteins and organic and synthetic textiles, although substances containing a blend of components may produce ambiguous readings. Reflectance FTIR is contactless and works on uneven textile surfaces, making it particularly suitable for analysing pattern book samples (Morgan, 2017; Howell and Snijders, 2020, chap. 5; Dress and Textiles Specialists and Plastics Subject Specialist Network, 2022). Wertz found it successfully identified the oil present on cotton fibres subjected to Turkey red dyeing processes. This means that FTIR could be used to distinguish fade-resistant, Turkey red fabrics from other red-dyed fabrics in textile collections, enabling custodians to make informed decisions about exhibiting and conserving these textiles (Wertz *et al.*, 2017). V&A staff used spectroscopy to analyse pigments on the Leman design album: FTIR confirmed the presence of lead white pigments, which had changed colour from white to red, brown and black, due to environmental exposure (Burgio, 2017a). Furthermore, Raman spectroscopy, which employs lasers, revealed that arsenic glass formed the colour in Leman's orange paint. Tests on designs by other designers linked with Leman produced the same result and showed that, far from being a rare substance, arsenic glass was widely used in Spitalfields in the early eighteenth century in pigments employed in textile design (Burgio, 2019).

X-ray fluorescence (p-XRF) works on similar principles to spectroscopy but employs x-rays to detect metallic elements present in pigments and dyes. Conservation staff at TNA applied the technique to samples of Victorian wallpaper in Board of Trade representation registers to seek out arsenic, which was used as a colourant in wallpaper paints, especially green shades. Their findings proved valuable for informing the future care of the collections, as they established that, of the 279 wallpapers sampled, over 164 could contain arsenic compounds and critically, that not all the green paints contained arsenic, while

some cream, brown and yellow shades did (Wilson, 2017).[93] Metallic elements were used in textile dyeing to help bind the colourant to the fibres, so Alcántara-García and Nix (2018) used p-XRF to identify which elements were utilised to dye samples of worsted wool cloth manufactured in Norwich c.1790-1793 and compensate for the lack of surviving written recipes from Norwich dyers. Their analysis detected tin, used to form bright red and yellow colours; copper and iron, good for darkening colours; and zinc, incorporated to develop pinks, reds, and purples. The presence of arsenic they attributed to it having been used to fumigate the pattern book at some date.

Chromatography is the most common invasive analytical technique applied to archives and textiles to identify natural and synthetic organic materials, including paper, ink, gums, pigments and dyes. High-performance liquid chromatography (HPLC) and ultra-high-performance liquid chromatography (UHPLC) are used to identify dyes on historical textiles. The dyes are extracted from the fibre sample, prepared, tested with different detectors and the data compared with reference samples (Quye, 2020). The V&A used UHPLC to analyse threads extracted from eighteenth-century silk textiles, which confirmed the presence of the fade-resistant natural dyes indigo and cochineal and very light sensitive annatto and safflower; conservators will use these results to inform how they display the silk and protect it from fading (Burgio, 2018). At the University of Glasgow, Wertz found that UHPLC could successfully distinguish between the natural dye madder and synthetic alizarin on threads from Turkey red-dyed cloth and hence assist with dating the fabric, as alizarin, which was introduced in 1868, had virtually replaced madder commercially by 1873 (Wertz *et al.*, 2017). Meanwhile, gas chromatography helped Alcántara-García and Nix (2018) to ascertain that water-soluble natural gums were used to glaze samples of callimanco, which means that the cloth should be stored at mid-range relative humidity to prevent the glaze drying out or softening.[94] Overall, for heritage custodians and conservators, the ability to identify fibres, dyes and other components present in collection objects through the use of chromatography, spectroscopy and other scientific tools enables them to store, display and treat objects in ways that supports their long-term preservation.

[93] The *Poison Book Project*, run by the University of Delaware and Winterthur Museum, is also using X-ray fluorescence to identify nineteenth-century, green cloth and paper book covers which contain arsenic, https://sites.udel.edu/poisonbookproject/ (accessed 5 Feb 2025).

[94] Callimanco was a lightweight worsted wool fabric with a sheen, mainly manufactured in Norwich (Nix, 2021b). The Met has published photographs of Norwich callimanco cloth (Ref: 2017.268) www.metmuseum.org/art/collection/search/746487 (accessed 19 Aug 2024).

As cutting-edge technologies become accessible to conservation scientists, their application is expanding from analysing substances on or in documents to virtually opening damaged or sealed items and uncovering information about past users or the places where the documents were held. Few archivists are likely to encounter these techniques in the workplace, as they require specialist equipment and knowledge and are costly. But a couple of examples are included here to show what is possible, because this could inform archivists' appraisal or preservation decisions. Many archivists encounter documents whose pages are fused together because of water or fire damage, or which are sealed, and they have to decide whether to open them, despite the damage that will cause, or leave them unread. High-contrast X-Ray Microtography (XRM) is able to virtually open folded, multi-page documents and retrieve the text. The document is scanned in blocks and computer scientists develop and apply image processing algorithms to assign the text to layers, allowing researchers to read each page and decipher the text. The technique has proved successful on water-damaged documents and has been used to read seventeenth-century letters which their senders sealed using paper-locking techniques and which remain unopened, as they were never delivered (Dambrogio *et al.*, 2021; Mills, 2023).

Meanwhile, proteomics, the study of proteins on archaeological and historical artefacts, is revealing insights into who used them, and how. Staff at the Folger Library, inspired by the DNA process by which Richard III's body was identified in 2012, conducted genetics research on dust swabbed from the gutter of a Bible published in 1637. DNA sequencing identified two individuals, most likely from Northern Europe and suffering from acne. The Folger Library now retains dust and other material lurking in their books for potential biological study (Shakespeare & Beyond, 2019). Proteins can testify to the presence of disease. In 1630, Milan was struck by an outbreak of bubonic plague and, as the city's death registers attest, nearly half the city's population died. Scientists Pier Giorgio Righetti and Gleb Zilberstein swabbed these registers for proteins to see whether traces of *Yersinia pestis* bacterium were present. Among the six hundred proteins which they extracted, they found seventeen belonging to the *Yersinia pestis* family, as well as proteins from mice and rats, and from fragments of meals consumed by the clerks registering the deaths, namely chickpeas, rice, carrots and maize (Knight, 2018).

As this survey has demonstrated, the range of imaging techniques, digital tools and scientific analyses useful for scrutinising and studying the materiality of heritage artefacts, including textiles and pattern books, is astonishing and ever-growing. While the more

advanced technologies are beyond the resources (and requirements) of the average repository, researchers are demonstrating how much can be achieved with tools which are readily available, not least the phone many carry daily. It is exciting to see what technology offers institutions and researchers keen to appreciate and study records as material, three-dimensional artefacts. However, one crucial aspect is often overlooked or masked when records are made available digitally: their physical relationship to other records.

Material relationships and contexts

As discussed in the previous chapter, the concept of context is central to archival theory and practice. Archivists go to considerable lengths to investigate and explain the provenance of records, the biography of record creators and the function(s) records served before they were designated as archives. But records' intellectual context (who owned the records and how they used them) is amplified and clarified by their physical context. How past owners physically organised, packaged and stored their documents, and the mystifying places where some records end up, contribute valuable evidence for understanding how the records were used and perceived by their owners (Breakell, 2023). Consequently, researchers need access to information about records' physical context, whether they are accessing collections in person or digitally. But searchroom protocols, off-limit strongrooms, digitisation practices and portal design can make it difficult for researchers to ascertain which records were bundled together, and how.

In the searchroom, a researcher is handed a folder or bundle of loose papers (subject to searchroom policy) and, if they are as they were received, can see how they were organised by past owners. Historian Michelle Moravec (2016) describes how she works through a box of folders in a searchroom, methodically taking each folder and turning through its contents item by item, in sequence. Exploring the documents in context deepens her understanding of their provenance and relevance. The physical placement of a document can be critical to interpreting its contents. The prisoner's letter which Arlette Farge encounters in a file of official papers from the Bastille needs to be read within that context to deduce the story's outcome (Farge, 2013, p. 9). In online catalogues, physical relationships may not be clear. Paper-based cataloguing theory and practice do not translate well to digital methodologies, especially the rule not to repeat information across levels. Search engines take researchers straight to records whose description contains the words typed in the search box. But, depending on the software's capacity to represent

collection structures and relationships, and how documents have been described, researchers, especially those unfamiliar with the conventions of archival description, may not realise that the item they are looking at on the screen is one element in a series of related material (Jeurgens, 2013). Even if the researcher is familiar with how collections are structured, the software may not allow them to see the entire listing for a collection while they view individual records (Anderson, 2006). The Archives Hub portal addresses this by representing each collection's structure visually, highlighting the record the user is reading and providing a split-screen view so the tree remains in view as the user looks at individual records (Figure 29).[95]

Figure 29. Screenshot of collection tree, Archives Hub

Digital galleries also vary in their ability to convey records' physical relationships, and it can be particularly hard to discern which papers belong in one bundle or folder. Rekrut (2014) described how the Archives of Manitoba digital portal included a folder containing images of an envelope, postcard and piece of paper, all presented as similar in size, leading viewers to assume falsely that the envelope contained the other two items; in actuality, the postcard is larger than the envelope. NLS has digitised manuscripts and letters written by, or associated with, child writer Marjory Fleming of Kirkcaldy (1803-1811). Surveying the digital thumbnails, the viewer has to depend on page formats and handwriting to determine which pages form one document, as metadata clarifying this is not visible in the thumbnail view, although it is provided under the index page view. Neither the digital gallery metadata nor the archive catalogue record explains that these papers have been mounted in a guard book (a blank volume with paper strips to which documents can be glued), only critical study of the images reveals this fact.[96] The digitisation process itself may have long-term consequences for interpreting physical context, if folded documents are flattened

[95] The tree is clear and useful to an expert user. What someone new to archival research makes of it may differ. The Archives Hub does provide guidance.

[96] Marjory Fleming papers (NLS MSS.1096-1100), https://digital.nls.uk/100989212 and https://manuscripts.nls.uk/repositories/2/resources/19193 (accessed 19 Aug 2024).

for copying. Flattening records removes physical evidence about how they were folded and organised. Conservators may photograph folded papers prior to flattening, but these images, and any taken of documents' folders or bundles, are rarely put online, obscuring how the papers were managed by past owners (Jeurgens, 2013).[97] If, post digitisation, the smoothed documents are stored flat in a folder, which seems to be the preferred policy, rather than re-folded and restored to the bundle they were part of for two hundred years, their physical context is altered and important evidence lost, especially if this change goes undocumented.

Presenting individual samples from pattern books in isolation limits how they can be interpreted. Researchers need to see all the samples on one page, in one volume and in the company's other pattern books to comprehend what products the company produced for whom and how that changed over time. William Stirling & Sons started as a general calico printer and dyer, before specialising in Turkey red production from the 1820s (Nenadic and Tuckett, 2013, p. 5). One sample from Stirling's 1815 Cordale printworks colourist's notebook (NLS MS.17975) would not tell a researcher much about the firm's business. Surveying the whole volume, the researcher develops an impression of Stirling's design repertoire and colour palette at that date and which market(s) the firm was targeting. Juxtaposing these 1815 patterns with those in Stirling's other surviving pattern books, all from their Turkey red era, provides deeper insights into the evolution of Stirling's business. The Ausberg Museum has digitised historic pattern books from the local region's calico printing industry and published the three thousand samples they contain online in a dedicated visualisation interface. Viewers can explore the samples by colour or motif, but they float free of their physical context within their pattern books. There is no option to browse by volume or manufacturer, or date, so viewers cannot contextualise a sample in terms of a firm's output or prevailing fashions for an era.[98]

Digital tools do have the potential to enhance researchers' access to, and understanding of, physical context. Once documents are transferred to the repository, physical organisation and proximity can be lost to researchers' - and archivists' - view. Excluded from strongrooms, researchers cannot take in the run of volumes, pile of folders or stack of

[97] Conservators routinely document their work, but their notes and photographs are rarely added to the public portal, or even available to other staff (Jones, 2018).

[98] The volume and page reference is given for each sample but cannot be used to navigate the data. AI was used to categorise the samples by motif e.g. plants, squares or folklore. The project also used AI to create 75,000 new designs, based on the original samples, see https://calico.timbayern.de/erleben (accessed 19 Aug 2024). My thanks to Eva Büttner for her assistance with this website.

boxes forming a collection. Even staff only gain a partial impression, since records are usually stored by size and format to maximise space and thus a collection may be distributed across several bays or even strongrooms. Digital representation offers scope to show users what they cannot see in person, preserve information about how collections were physically organised by their owners and provide new, creative ways of visualising and interacting with records. Breakell (2023) describes how designers Anthony Froshaug and FHK Henrion curated their business papers: Froshaug haphazardly, Henrion meticulously and consciously. Transferred to the archive, the way in which each designer packaged his records and the impression they made within his office, are lost. Breakell considers how archivists can document this for posterity and share it with users, for example, by taking photographs of the boxes and folders in the owner's office prior to deposit, if possible, or on receipt, and describing the impression they convey. Francis Palgrave, Keeper of the Exchequer Records, employed lithographed drawings and description in his 1836 guide to the collections to communicate how Exchequer records were stored. Plate II shows what Palgrave described as 'an ancient skippet turned in the lathe' and which contained a deed executed by the Bishop of Hereford. Plate V (Figure 30) conveys the shape, size and design of four pendant seal bags and presents them in context, if artistically, with their documents. One bag, attached to a grant made by Henry I, Palgrave described as a 'bag of very stout silk lined with coarse linen' (bottom right in the drawing). In the centre, the viewer can see the design of an oval, gold-flowered damask bag (attached to a grant made by Thomas Becket, Archbishop of Canterbury), which Palgrave informs us has a red silk lining (Palgrave, 1836, p. cxlvii–cxlviii). Digital tools could do something similar.

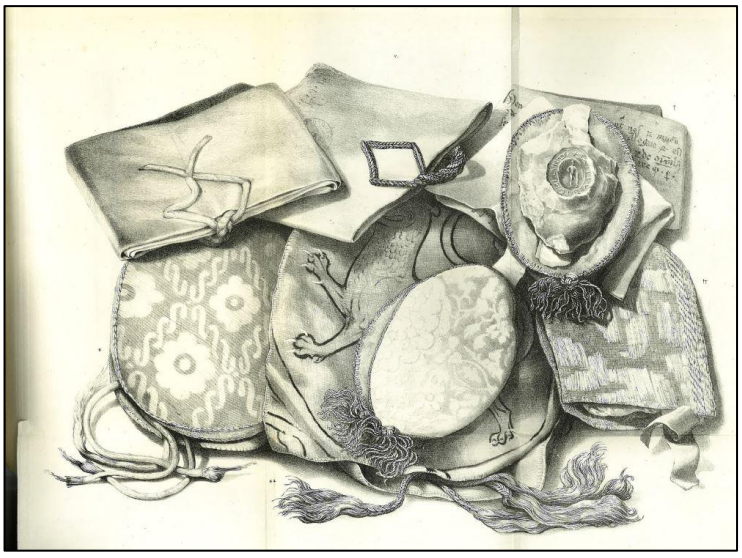

Figure 30. Lithograph of seal bags, from F. Palgrave, *The antient kalendars and inventories of the treasury of His Majesty's Exchequer* (London, 1836), Plate V

The Courtauld addressed this question when digitising its Conway photographic collection.[99] The Institute committed 'to honouring the material essence of the photograph as a physical object [and] maintaining the original context of the material image.' (The Courtauld, 2023). Digitisation preserved evidence of how owner Martin Conway organised his collection and documented traces of usage and curation - notes, labels, numbering and tears (Rose, 2021). Conway and his assistants mounted the photographs on sheets of paper, to which they added metadata identifying each subject and site. They placed the sheets in folders and filed the folders in boxes (The Courtauld, 2024). Rather than closely cropping the digitised version of each photograph so that viewers only see the subject, the Courtauld has presented each photograph online on its paper backing, so that viewers see its context and Conway's notes. Viewers are also shown images of its brown manilla folder and the box in which that folder resides. Even Conway's storage boxes are presented within their physical context. For example, the image of the box containing photographs of Albania depicts it sitting within an alphabetical sequence of ten boxes representing countries starting with A, from Afghanistan to Armenia. In the website's collection tree view, the thumbnails present the box, folder and sheets for each entry (see the screenshot in Figure 31).[100]

Figure 31. Collection tree view for Beauchief Abbey records, Conway collection, The Courtauld

[99] Martin Conway (1856-1937) collected and commissioned photographs covering the decorative arts, sculpture and architecture, including the photographic recording of bomb-damaged buildings.

[100] See, for example, https://photocollections.courtauld.ac.uk/sec-menu/search/detail/3dbc1da8-8d14-11ed-aa36-ac1f6ba5b082/media/921104c7-5bbc-e1d9-1eaf-eea395f2d3fb.

The *Prize Papers* project is also experimenting with ways to photographically present physical context, in their case for packets of letters. One method they are trialling involves laying out the contents of a packet in sequence, showing how letters enclosed other letters or objects. Project team members are pondering how to compose the shots so that viewers understand what is being represented. Presenting letters in context provides researchers with visual data about national postal conventions. For example, the French ship *Le Fort de Nantes* was captured *en route* from Mexico to Cadiz in 1747. Its cargo included Spanish mail in transit between Spain and Spanish overseas territories. An overhead photograph of the entire contents of one mail bag demonstrates that, despite originating from persons in more than one country, the letters conform to the size and format conventionally used in the Bourbon postal system. Most carry imprinted seals and are addressed with the long address lines typical of Spanish letters (Prize Papers, 2023).

Photographs documenting organisation are a useful first step in conveying physical context. But just as digital imaging and tools can explore the materiality of records in ways that physical examination cannot, they also afford creative ways of documenting and exploring physical relationships. Sarah Werner muses how libraries could go beyond simple visual representations of context, such as The Courtauld's box shots, and exploit digital capabilities to provide a richer experience. Jeffrey Martin took 3,000 photographs of the Philosophical Hall in Strahov monastery library, Prague, and stitched them together to create a high-resolution, panoramic view of the space. Published online, viewers could zoom in, read the spines of the 42,000 books on the shelves and see how they were arranged (Rail, 2011).[101] Werner (2012) suggests how technology could enrich a shelf view like this by linking the image of each book to the catalogue, and even allow viewers to virtually re-arrange books by provenance or date. A project by Ligatus (part of the University of the Arts London) and the National Trust used augmented reality technology to enhance onsite visitors' experience of the library at Wimpole Hall, Cambridgeshire and provide them with information about historic bookbindings. Conforming with standard practice in historic houses, the public may walk round the library, but cannot handle the books. Selecting twenty books with interesting bindings, the team made one-minute videos describing and explaining points of interest, while their augmented reality tool enabled visitors to undertake self-directed exploration of the books. During the pilot in July 2018, visitors entering the library were handed a mobile device to hold up to the library shelves. The technology identified books by their spines and brought up

[101] The panoramic photograph is no longer accessible online.

information about each book. Usually, visitors spend little more than a minute in the library, but dwell time increased to around fifteen minutes when visitors used the book tools (Maniatis, 2018; *Augmented browsing of books in historic libraries*, 2018).[102] This project reveals that historic house visitors are keen to explore the physical properties of historic books, and consequently challenges library custodians to find ways to embrace Werner's vision and enable visitors to engage deeply with the books, their contents and careers, while protecting the collections. One way to achieve this may be through an online version of the Ligatus tool, which could open up collections to a wider audience and point viewers to complementary resources such as WorldCat, where they could find further information about the books.

One digital method which can creatively portray archives' complex intellectual and physical relationships and enable users to explore collections in new ways is data visualisation. Visual, diagrammatic representations of archive collections have a long history. For example, C.A.F. Meekings' diagram for the Court of King's Bench files, 1300-1700, shows the date each record type used to deliver functions of the court was introduced, ceased or modified (1978, p. 124). Viewers can see which record types were active at the same time and potentially had a functional relationship. Geoffrey Yeo (2012) champions digital's affordances for creating fluid, dynamic representations of collections which convey records' multiple relationships. Mitchell Whitelaw has exemplified how data visualisation can communicate the scale and complexity of collections through welcoming interfaces which facilitate exploration, what he calls 'generous interfaces' (2015). Whitelaw's visualisations provide new perspectives on records' arrangement and functional relationships. His prototype visualisation of 65,000 record series in the National Archives of Australia portrays both the quantity of records in each series and the intellectual relationships between series. Each series is represented by a square whose size reflects the number of items and amount of shelf space it occupies (*Visible Archive Series Browser*, 2012).[103] Coloured lines link related series which functioned at the same time or which followed sequentially, akin to Meekings' diagram. Viewers can select a specific department and browse all the series its records inhabit (Whitelaw, 2011). Visualisations can be fun and provide fresh pathways into collections. Students from the University of Edinburgh's Data Science for Design course analysed data about the first eight editions of

[102] Maniatis does not explain what information visitors could access via the spine-reading technology.

[103] Whitelaw discovered that there was not a direct correlation between number of items and shelf space.

Encyclopaedia Britannica, including the number of entries, recurring subjects and number of words borrowed from other languages, then created a visualisation of their findings in Minecraft, traversed by rollercoaster (*Data viz of Encyclopaedia Britannica in Minecraft*, 2020).

The relationship between physical and digital artefacts

As the preceding discussion demonstrates, imaging technologies and digital tools offer a wealth of options for showcasing and interrogating records' physical characteristics and contexts. In reality, what individual institutions can achieve is, as the institutional case studies demonstrate, shaped by practical constraints like time, money and access to skills and technology. Leading libraries and elite manuscripts have benefitted from generous external funding and access to IT specialists and high-specification equipment to deliver material-rich digital access. Archive repositories seeking to digitise modern records generally find it harder to access comparable funding and resources to achieve similar outcomes. But the way in which archives approach digitisation also depends on archivists' perspective on the affordances of the digital representations and their relationship to their physical counterparts.

Humanities scholars have a long history of producing printed, edited transcriptions of manuscripts and archives, and the scholarly community has debated how to represent the texts, their layout and appearance for many years. When the Hunterian Club was formed in 1871, members aimed to produce an accurate reproduction of a book's first edition, 'giving an exact rendering of page, line, and word, with the illustrations, initial letters, etc., in facsimile' (Hunterian Club, 1902). Historian R.F. Hunnisett believed that transcripts of archival records 'should be the most faithful possible', but that they were also to be 'set out in the most easily comprehensible way', which meant using modern conventions for punctuation and capitalisation, rather than replicating the scribe's idiosyncratic style (Hunnisett, 1977, p. 23). Transcribing texts has given this community a framework with which to approach the creation of digital editions. Jerome McGann found the process of transferring a text from one medium to another akin to translation (1991, p. 53); Hayles (2003) concurred. She recognised that printed text cannot be mapped directly to digital format because the physical characteristics of paper and digital differ, so interpretive decisions must be made. When *Early English Books* (EEB) converted from microfilms to digital format, the editorial team had to make choices about layout, font, spacing and

navigation for their searchable digital transcriptions of the printed books (Mak, 2012, p. 64).[104]

Within the archive sector, digitisation as translation is not a concept which prevails. Dutch archivist Charles Jeurgens emphasized that choices made about the digitisation process and the type of metadata added lead to 'the creation of a new informational object', not a replica of the physical record (2013, p. 34). But digitisation discussions or guidance rarely include this angle, concentrating instead on selection, file formats, access and sustainability.[105] Archival digitisation has generally been viewed as the successor to microfilming, a method for the rapid imaging of page views of records to disseminate their content to remote audiences or provide surrogate access to fragile material (Moss and Currall, 2004; Prescott, 2019). However, microfilming does not provide a model for capturing, or thinking about, records as artefacts. A representation of a three-dimensional document on monochrome microfilm is far removed from the physical object. Winding forwards and backwards through micrographic images magnified on a machine cannot replicate the experience of turning paper pages. Hugh Taylor reflected on the potential impact of viewing a document as light shines *through* it, via microform or transparency, rather than *onto* it, as with paper, observing, 'Micrographics is more than a "ditto" process. It involves a significant media change from "light on" to "light through" which may subtly alter our perceptions'. He urged archivists to think carefully about how users experience a document in different media, especially microfilm, and to learn the skills to recognise the most appropriate medium for a record in any given situation (Taylor, 2003, pp. 71–72, first published 1978). Marlene Manoff drew on the *EEBO* project to challenge perceptions within the academic library sector that printed books and journals could simply be substituted with electronic versions because the text remained the same. She argued that the medium through which data is transmitted impacts reception and interpretation. Consequently, the four textual versions associated with the EEBO (print, microfilm, scanned microfilm and born-digital transcription) provide contrasting user experiences, transmit knowledge differently and 'require different practices of knowledge making' from users (Manoff, 2006, p. 323).

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[104] The digitised texts were produced by scanning the microfilms. The digital platform became *Early English Books Online* (EEBO).

[105] See, for example, Kenney, A.R. and Rieger, O.Y. (2000) *Moving theory into practice: digital imaging for libraries and archives*. Mountain View: Research Libraries Group; Deegan, M. and Tanner, S. (2002); and Hughes, L.M. (2004) *Digitizing collections: strategic issues for the information manager*. London: Facet Publishing.

Rekrut (2014) points out how microfilming protocols addressed questions of communicating physical features and suggests they offer a template for digitisation. She points to microfilming's use of 'targets', sheets of paper containing written information about the film's contents, omitted and damaged pages, etc., which were incorporated into the film. She highlights how operators placed a black sheet behind a damaged page to make the damage visible. While digitisers no doubt take careful notes about omitted and damaged pages, as Rekrut pointed out, their notes do not necessarily get incorporated into the catalogue record. She draws attention to protocols for microfilming scrapbooks containing folded documents, which recommend that the page is photographed 'as is', then photographed as each item on the page is unfolded. This would be helpful advice for anyone digitising David & John Anderson Limited's correspondence with their London agent (Figure 32). The firm pasted the letters into a blank volume in chronological order, layering and folding them to maximise the space in the portfolio. This layering makes the volume awkward to handle in person and difficult to digitise in a way that conveys how the letters are physically organised.

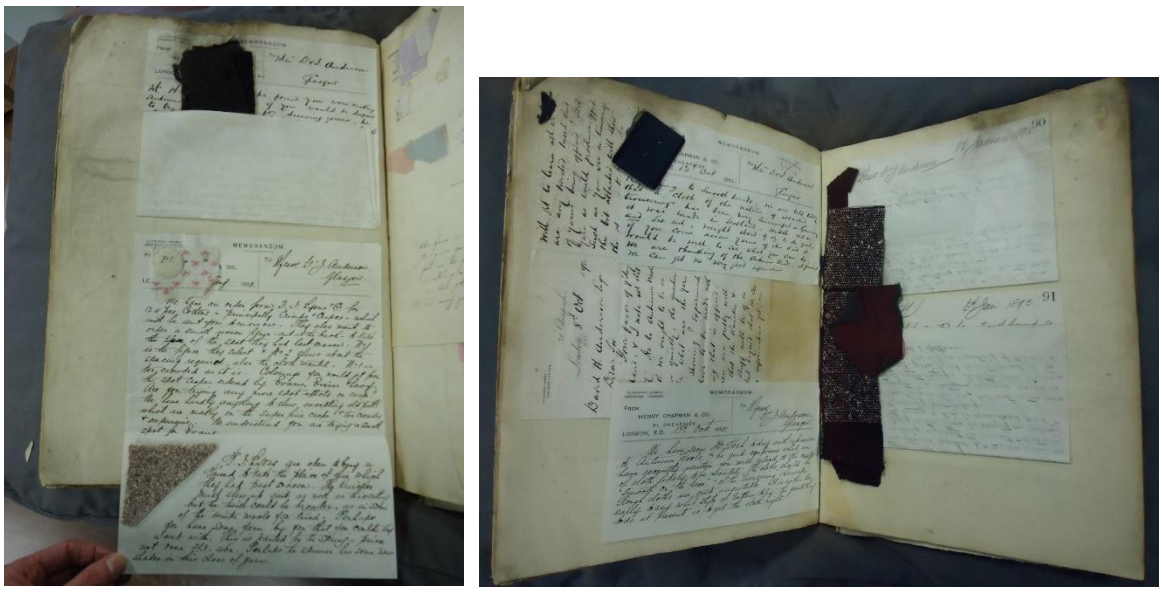


Figure 32. Folded and interleaved letters, David & John Anderson Limited, 1891-1910 (ASC UGD022/8/1/1)

Manoff, Hayles and McGann emphasize that physical and digital representations are not in competition. One medium is not superior to another; instead, they should be seen as equal and complementary. As Deegan and Tanner observed, 'the analogue and digital will intertwine as different instantiations of an information object – sometimes it is the analogue version satisfying the user's need, sometimes the digital.' Deegan and Tanner advised that putting a digital version of a manuscript, document or book online increased

requests to view the original, something other literature, and project participants from NLS and UofG, confirm (Deegan and Tanner, 2002, pp. 33, 37; see also Anderson, 2006). Loyola University's conversion of its nineteenth-century library catalogue into structured data allowed researchers to analyse its founding collection and prompted students to seek out the surviving books. Examining the books encouraged students to learn about historic bookbinding and letterpress printing and investigate the stories behind the books' careers before their donation to the university, stories which they then shared online. Thus the synergy of physical and digital interaction created new knowledge (Roberts, 2016). Given the difficulties in reproducing the colour and texture of fabrics digitally, textile researchers probably require access to the original pattern books. But digital versions allow researchers to examine and compare dye recipes or manufacturing data, or answer questions about a firm's designs, textile types or pattern books' functions. Many researchers work between physical and digital versions, examining records in person, photographing them and then conducting research on the digital representations. Engaging with both versions enables researchers to use their physical encounters with pattern books to guide their reading of digital versions. If more pattern books are digitised and researchers have fewer encounters with the physical records, researchers may lack the sensory, tactile knowledge to interpret evidence seen digitally, especially if digitisation masks physical evidence, rather than highlighting it. The growth of digital access to manuscripts, newspapers and early English books has changed how researchers access these sources, as well as which ones they use (Prescott, 2014), and, for those who rely on them, presumably their familiarity of working with physical versions, and with the process of discovering physical archives, is diminished. Eden, Jirotka and Meyer (2012) provide an example of a musicologist teaching her student how to distinguish holes from stains in digital images of a medieval music manuscript and perhaps similar training or guides may be needed to help new researchers access digitised pattern books. Questions relating to remote, mediated access to archives are discussed in the University of Glasgow case study in chapter 5.

One challenge to providing material, context-rich digitisation is that many archivists and librarians are under pressure from their institutions and governments to digitise as much as possible as quickly as possible and they are appraised by the number of items converted to digital format. Having a large quantity of digital content available is seen as a measure of relevance and success, rather than the richness of the digital objects as representations and their usefulness for research beyond content-reading (Prescott, 2019). This may not matter

if users still have open access to records which have been digitised. However, given that only a small subset of material can be digitised, high-use and/or fragile records are often prioritised, with the intention that physical access to them post-digitisation will be curtailed (Forde, 2005). If the representation is only suitable for accessing content, then audience requirements for views showing physical characteristics and context will be unmet.

Terminology

If archivists are to be encouraged to think about digital versions of records as independent objects with their own strengths and affordances, then perhaps the sector needs to consider the terminology it uses to describe these representations. While it is hard to quantify, 'surrogate' occurs regularly in the literature.[106] As Porter (2018) describes below, a surrogate is something which stands in for something else, it 'is there to act for and on behalf of the original, not to replace it' (Lindsay, 2003, p. 47), a view echoed by Moss and Currall (2004). Classifying a digital version as a substitute downplays its independent merits. Carol Campbell, Head of Metadata at NLS, objects to the library world's use of 'surrogate' for digitised versions of print books; she would prefer libraries to describe these digital versions as distinct entities with their own copy-specific features (Campbell, 2022). Dot Porter explores the nuances of terms applied to digitised manuscripts and what they communicate about the relationship between physical and digital artefacts:

> '*Facsimile* literally means *make similar*, so if I call a digitized manuscript a facsimile, I draw attention to its status as a copy. *Surrogate* […] generally means something that stands in for something else. So if I call it a surrogate, I draw attention to its status as a stand-in for the physical object. *Avatar*, finally, refers to *manifestation* […] now used to refer to people or physical objects manifesting in digital form. So if I call it an avatar, I draw attention to its status as a representation of the physical object in a digital world. Not a copy, not a replacement, but another version of that thing.' (Porter, 2018)

Porter favours 'avatar' for the equal standing it gives to the digital object. Campagnolo likes the term 'digital cultural object', at least when digitisation exploits the full capabilities of digital technologies. For him, such objects 'transcend the originals, work in

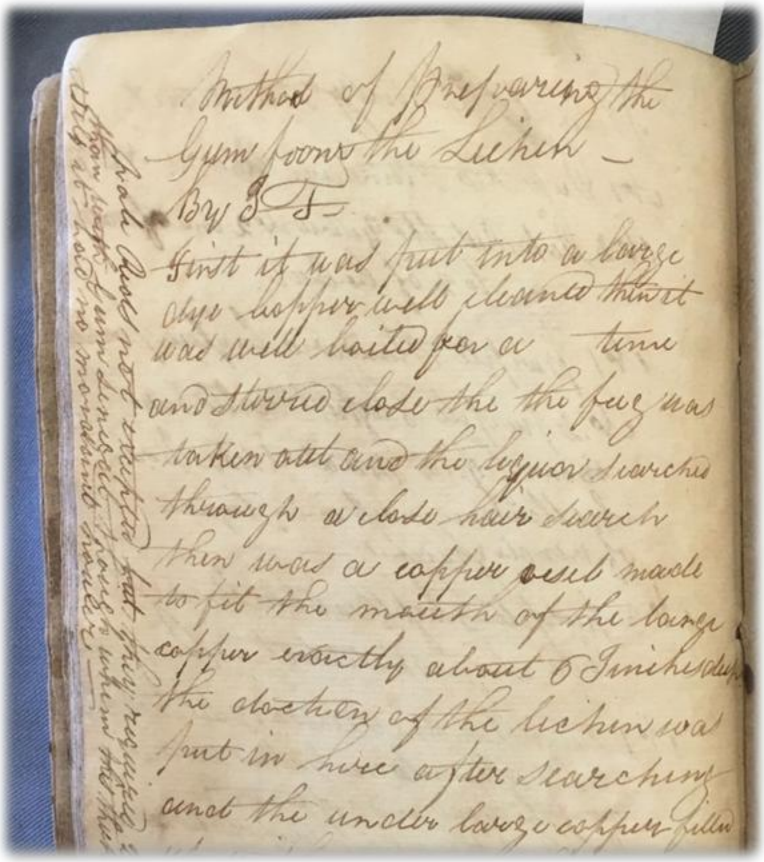
[106] See, for example, Moss and Currall, 2004; Forde (2006); and Varnalis-Weigle, A. (2016) 'A Comparative Study of User Experience between Physical Objects and Their Digital Surrogates', *Journal of Contemporary Archival Studies*, 3.

synergy with them and make them something more' and can be augmented and modified over time, rather than created as fixed and immutable (2020, pp. 2–3, 75). As avatar may not be meaningful to all audiences and digital cultural object could refer to a born-digital item, this thesis uses 'version' or 'representation' to express the separate but related nature of the digitised record and the original document. Perhaps professional dialogue about suitable terminology for digitised records would be an entrée into a broader discussion about digitisation as translation and its capacity to represent records as artefacts.

Conclusion

Interacting with a digital representation of a pattern book is not the same experience as interacting with the physical object. The digital environment does not communicate size, mass, texture or smell effectively or at all, nor can it truly replicate the haptic and sensory experience of seeing, touching, hearing and physically manipulating a book, document or textile. But digital technologies allow researchers to take a deep dive into the material properties of records in ways that could be complicated or impossible physically. They can bring to light erasures, water-damaged text, preparatory designs, woven patterns and surface textures. Dyes, pigments and mordants can be identified, supporting conservation and research needs. Researchers can compare and investigate text, layout, designs and fabrics across documents, regardless of their location, and analyse catalogue and record data at scale. Immersive technologies can virtually recreate lost manufacturing sites and situate records and artefacts within them, enriching communities' understanding of their heritage and how textile manufacturing shaped the locality and people. All these possibilities depend on how pattern books are digitised and made available, which in turn is a result of how their custodians view the role and possibilities of digital representations and address the practicalities of digital access. The next chapter presents the findings of five institutional case studies, which explored GLAM professionals' approaches to digitisation and materiality and the ways in which institutional priorities and operational realities shape what is undertaken and the manner in which it is approached. What material-rich digital access for pattern books looks like and how it can be facilitated is examined further in chapter 6.

Innovating


Method of Preparing the
Gum from the Lichen –
By J. T.
First it was put into a large
dye copper well cleaned then it
was well boiled for a time
and stirred close the the fire was
taken out and the liquor searched
through a close hair search
then was a copper vessel made
to fit the mouth of the large
copper exactly about 6 inches deep
the clothen of the lichen was
put in here after searching
and the under large copper filled

Business frequently requires compromise between the ideal and what internal priorities and external factors dictate. Nineteenth-century calico printers in Britain used gum arabic, imported from Senegal and Mauritania, to thicken mordant pastes so they adhered to the printing block or plate. When the cost of the gum soared during the Napoleonic Wars, Lord Dundonald suggested the Scottish printers try making gum from local lichens instead. Patrick Mitchell, general manager at William Gillespie & Sons, Glasgow, experimented with a recipe he obtained from 'J.T.' and concluded that lichen gum made 'an excellent thickening'. Despite this, lichen gum was not taken up by the industry.

Figure 33. Recipe to make lichen gum, in Patrick Mitchell's daybook, William Gillespie & Sons, 1808 (NLS MS.17966)

Chapter 5 Institutional case studies

Introduction

The archive sector and its professional staff are at the heart of this project and are the intended audience for the project findings. The institutional case studies are therefore central to the research since the project outcomes, if they are to be meaningful, need to be grounded in a clear understanding of sector priorities, capabilities, existing practice and aspirations. The case studies focused on four areas: cataloguing, digitisation, digital access and materiality. Cataloguing is fundamental to digital access, as collections cannot be discovered and evaluated by users if no information is available about their contents and context. The case interviews explored cataloguing approaches and what progress institutions were making towards retro-converting paper-based and unstructured digital (e.g. Word) catalogues into structured digital data. Digital versions of physical records similarly need metadata to provide context. 'Digitisation' encompasses many methods of creating digital data from analogue source material, be that extracting catalogue metadata, taking still and moving images, applying advanced technologies like multispectral imaging, and undertaking scientific investigations such as DNA and dye analyses. Digitisation practices applied within case institutions were discussed with participants, as were the ways in which services are providing user communities with digital access to collections metadata and digitised sources. Consideration of books and documents as material artefacts was woven through the discussions, along with questions about institutional priorities and resources and how these influence what services can achieve.

The Methodology chapter contains a full explanation of how the five case institutions and interviewees were selected. Factors included the digital activities being undertaken, attention to materiality, scale of operations and sector. Southwark Archives and Sunny Bank Mills Archive were chosen because they are digitising textile heritage collections and reflecting on how digitisation can communicate material properties. The National Library of Scotland (NLS) and Natural History Museum (NHM) are digitising at scale and delivering digital initiatives of interest. The University of Glasgow's Archives and Special Collections (ASC) has developed expertise in using visualisers for teaching and research, is building a new online catalogue and enriching textile record descriptions. The findings from each case are examined in turn, before the chapter concludes with an analysis of the overall learning about GLAM professionals' engagement with materiality, effective

methods for facilitating digital access to collections and how staff are navigating the challenges and opportunities they encounter in their working environment.

University of Glasgow Archives and Special Collections

The University of Glasgow was founded in 1451. Today, it employs around 8,000 staff and supports thirty thousand students (University of Glasgow, 2020); it describes itself as a research-intensive university. The University's stated purpose is to transform lives by inspiring people and taking action, and it sees collaborative partnerships as key to delivering that transformation (University of Glasgow, 2021). It maintains an extensive archive of its own corporate records and records donated by staff and alumni, and is custodian of, amongst others, the Scottish Business Archive, the Scottish Theatre Archive and William Hunter's library.[107] In 2015, the University's Special Collections and Archives departments amalgamated to form Archives and Special Collections (ASC). The University's Photographic Unit provides imaging services for ASC and the Hunterian Museum and Art Gallery.

As its mission and strategies emphasize, the University's academic reputation and standing matter corporately. Ensuring that activities enhance both University and departmental standing also matter to ASC and Photographic Unit staff; consequently, they invest in collaborative activities which raise the profile of the collections and ensure that they are discoverable by core researcher communities. Both departments have contributed to several multi-institution, externally managed, digitisation projects, including *Modern Genetics and its Foundations* (2012), *Digitising Mental Healthcare Archives* (2014-2017) and the UK Medical Heritage Library (McCann, 2021; Senior Assistant Librarian, 2021).[108] Collections metadata is contributed to the international union library catalogue WorldCat, corpus databases like Early English Books Online (EEBO), and the UK portal Archives Hub (Senior Assistant Librarian, 2021). Teaching, too, extends beyond the institution. ASC staff run teaching sessions for students at St Andrews and Strathclyde Universities, and even delivered a session for Information Studies students at the

[107] William Hunter (1718-1783) was a physician, anatomist, collector and teacher. He attended the University of Glasgow and donated his collections to the institution (*William Hunter's Library*, 2016).

[108] For *Modern Genetics*, the research papers of three University professors of genetics were digitised (Wellcome Library, 2012). For *Mental Healthcare*, the Photographic Unit digitised over 370,000 pages of records from the Crichton and Gartnavel Royal Hospitals (Stevens, 2017). *c.*7,000 books were digitised during the *Medical Heritage Library* initiative (*Library annual review, 2016-2017*, 2017).

University of Kansas. Assistant Librarian Bob MacLean remarked, 'They're not core users of ours, so it's done […] not as a quid pro quo, but because you want to help people as much as you can. This is why we're here!' MacLean recognises that there is a sectoral reciprocity in supporting the research community as, in common with most universities, Glasgow academics often further their research by accessing collections in other institutions, while ASC welcomes many external researchers (MacLean, 2022).

Catalogues and discovery

Until 2019, ASC lacked its own online catalogue so had to depend on a combination of external portals and internal channels, like the University library catalogue and website, to make collections accessible online. How to publish a growing body of digitised material proved particularly challenging, as the UofG library catalogue, where the rare book catalogue records are published, does not accommodate images (McCann, 2021; Senior Assistant Librarian, 2021). Images can be linked to catalogue records on Archives Hub, but the image viewer is basic, attaching links is labour intensive and the contributor has to host the images, so few services bother (Crabstick, 2022).[109] ASC turned to their website and Flickr. An illustrated online catalogue for the medieval manuscripts, long-running Book of the Month web feature (1999-2009) and online exhibitions were all hosted on the Library website (McCann, 2021; Senior Assistant Librarian, 2021).[110] In 2009, staff started creating an illustrated web catalogue for UofG's incunabula (fifteenth-century printed books); additional photographs of the books were published on Flickr (Senior Assistant Librarian, 2021). Flickr has been used to showcase numerous ASC collections, but staff are disappointed that the material has not attracted as many views as had been hoped. The Senior Assistant Librarian attributes this to a lack of time to promote the content and strategically tag it so it surfaces in search engines (Senior Assistant Librarian, 2021).

In 2015, after many years of testing and rejecting unsuitable collections management systems, ASC settled on EMu, as The Hunterian already used it (McCann, 2021), but the software required extensive configuration to meet ASC's needs. Existing collections data is being imported into the system, a slow process as, although the manuscripts catalogues

[109] Archives Hub is planning to implement IIIF functionality to improve the way the portal handles and displays images, see https://archiveshub.jisc.ac.uk/labs/iiif.html (accessed 19 Aug 2024).
[110] These resources remain available on the ASC website, see www.gla.ac.uk/myglasgow/archivespecialcollections/digitisedcollections (accessed 19 Aug 2024).

were able to be batch imported, the archive catalogues have had to be imported individually (Assistant Archivist, 2022). ASC had many paper catalogues which needed inputted manually; ASC staff, aided by UofG archive students, utilised their enforced remote working in 2020-2021 to add c.30,000 catalogue records to EMu and enhance over 165,000 existing descriptions. For a number of business collections, which only had a collection-level record online, they were able to retro-convert the full catalogues (Ashworth and McCrystal, 2022). Staff are busy adding document images to EMu, mindful that today's users expect to find digital views of documents accompanying collections metadata. Indeed, some users browsing the catalogues have emailed to ask where the button is to access the digital image, such is their expectation that there will, or ought to be, one. Staff are concerned that documents for which there are no images will be ignored by users, regardless of their informational value. They also feel that publishing even just one image of a document allows users to see its form and understand more clearly what it is (Senior Assistant Librarian, 2021). ASC's online catalogue went live in December 2019 (Ashworth and McCrystal, 2020), allowing users to search across the University's institutional and deposited collections, business and theatre archives, manuscripts and The Hunterian collections. They can view digital images, where they exist, beside the corresponding record description and browse collection hierarchies (Assistant Archivist, 2022). Despite acquiring EMu, ASC will continue to contribute data to Archives Hub and other aggregators, as staff believe that maintaining a presence on multi-institution and thematic portals remains an important part of collections discovery.

Staff recognise that researchers are increasingly engaging with artefactual aspects of records, and they have responded by including physical details for selected record types in descriptions. The Senior Assistant Librarian (2021) commented, 'People are interested more in the context of the collection, the actual item, the materiality, what the signs of use and engagement, the stains and the annotations are.' For rare books, staff list dimensions, describe the binding and document annotations, internal decoration or changes to the material form (Senior Assistant Librarian, 2021). Among the textile collections, colours and patterns on paper carpet designs were described in detail for the Stoddard-Templeton collection, a significant carpet design and manufacturing archive, and brief pattern descriptions have been added to sample book records in the United Turkey Red Co. Ltd. collection.[111] In-depth cataloguing like this usually depends on externally funded research

[111] An example of a Stoddard-Templeton record is carpet design Tigris in ASC's online catalogue (GB 248 STOD/DES/93/12). Item records for the United Turkey Red catalogue are not online.

projects or student placements (Senior Assistant Librarian, 2021; Assistant Archivist, 2022); one exception has been the lengthy project (2009-2017) to create comprehensive, material-rich catalogue records for the eleven hundred incunabula held by the University and other Glasgow institutions (Senior Assistant Librarian, 2021).[112] Material features such as original bindings, annotations and decoration have been prioritised, as well as ownership evidence (Baldwin, 2020). As student participant Adam Flynn observed,

> A brief examination of almost any of the incunabula […] reveals the book as a cultural artefact; its physical condition details the various ways in which previous owners have interacted with the object in such a way as to personalize and particularize it, thereby imbuing the book with a significance beyond its textual content. (Flynn, 2016).

The illustrated incunabula web catalogue can be explored by material feature, e.g. printers' pinholes or annotations correcting the text (University of Glasgow, 2023).

Digitisation

ASC staff embraced digital technology in the late 1990s, showcasing collections on the University website and scanning slides to provide images of objects; a digitisation suite was established in the early 2000s (McCann, 2021; Senior Assistant Librarian, 2021). Procedures for imaging and file management evolved in tandem with usage and new technologies. Now, the quantity of digital data being generated and stored, and the introduction of EMu, have prompted a review of all procedures, with the intention of producing a departmental digitisation policy (Senior Assistant Librarian, 2021). Currently, digitisation is driven by user demand, preservation and teaching (McCann, 2021; Senior Assistant Librarian, 2021). If a document is requested regularly in the searchroom or for copying, then staff may decide to copy the whole item to protect it from overuse. Security copies of unique and precious items are made in case of a disaster. ASC staff recognise that teaching staff cannot access grants to pay for copies, unlike researchers, so they try to support their academic colleagues' needs by prioritising the digitisation of core teaching materials. ASC senior managers also maintain a prioritisation list of items which they would like to see digitised, but this is largely aspirational, as the Photographic Unit is fully

[112] The University holds 1,036 pre-1501 books; twenty-six post-1501 books were also included in the project. Another sixty-two incunabula are held by other Glasgow institutions, including the Burrell Collection and the Royal College of Physicians and Surgeons (Baldwin, 2020).

occupied with customer orders and immediate departmental requirements (Senior Assistant Librarian, 2021).

As with cataloguing, digitisation procedures pay attention to capturing material properties. The binding, inside covers and blank pages (where appropriate) of printed and manuscript volumes are photographed, and overview shots showing the book on its stand taken. A colour patch cum ruler is photographed with each document to verify the colour calibration, but it is cropped out of the final image because it increases file sizes; clients rarely ask for it to be included (Dyer and Fullarton, 2021). Quality control is important to Photographic Unit staff, as they care about the Unit's reputation, and the University's; consequently, the photographers will not release output which they judge inadequate, although staff accept that compromise is necessary for fragile or tightly bound items (McCann, 2021). In the past, customers paid a fee for image requests, but this was dropped during the pandemic and has not been reinstated. Now, ASC supplies images free of charge and copyright and reuse are managed through Creative Commons licences (Senior Assistant Librarian, 2021).

Digital access: visualisers

As part of its pandemic response, the University made funds available to departments to purchase technology to deliver services digitally, allowing ASC to purchase three visualisers, high resolution cameras which are mounted on a stand or the ceiling and can be used with video conferencing tools to provide interactive remote access to collections (MacLean, 2022). As staff have gained familiarity with the cameras' affordances and learned what works best, they have found a growing number of uses for the equipment, but there have been challenges. Both ASC staff and academics discovered that mastering the skill of remote teaching and presenting using the visualisers takes time and practice, as the tutor needs to manage the technology, interact with the document, describe it to the audience and deliver the actual learning (MacLean, 2022). Hybrid teaching sessions, with some students in the room and others online, proved complex to deliver, and inequitable, as the online students received less attention, disengaged and did not contribute, so these were quickly dropped once full in-person classes resumed (MacLean, 2022).

The visualisers are effective tools for conveying how documents are constructed and function, and showcasing their material features, and ASC staff use them for remote and in-person teaching, external exhibition assessments, webinars, conference presentations,

public engagement events and remote appointments for researchers. As the archivist or librarian turns through a volume or document on-screen, their audience can see how a tight binding or thin paper hampers handling and use. The facilitator can zoom in on features which are hard to see without magnification, such as lettering on seals, and describe smells and textures. ASC staff also use the visualisers to record brief films focusing on the material qualities of books and documents, which are intended for teaching, but which could potentially be linked to the catalogue or website as well. Staff feel that these films, and the live remote sessions, offer a richer experience of the artefactual nature of the item than still photography, but they acknowledge that viewers miss out on the tactile experience and knowing/learning gained by being present, and physically interacting with, the artefact. While they have no evidence to suggest that remote access has an impact on students' learning, they do question how effectively students with limited or no prior experience of handling physical archives are able to interpret physical qualities of documents viewed digitally. For example, in 2020, a Russian student undertook a remote placement with ASC, studying illuminations in a fifteenth-century Bible. She received digital images and participated in live online study sessions but was still astonished to see how small the Bible was when she visited the archives in person (Senior Assistant Librarian, 2021, MacLean, 2022).

The technology has changed how document teaching sessions are delivered. Fewer documents are used because zooming in/out and handling each item takes longer; while this reduces the diversity of material students see, staff have found that discussions about each one are deeper than in pre-Covid sessions and all students can contribute, because no-one is left craning at the back. However, ASC staff's preparation time has increased, as they need to research subjects more thoroughly to facilitate the discussions and identify document features they want to highlight (MacLean, 2022). Being able to offer remote sessions has allowed ASC staff to introduce more students to collections, for example, large undergraduate classes in History and Economics, which cannot be accommodated onsite. They have also trialled joint sessions delivered simultaneously from both ASC sites, or with The Hunterian, and would like to offer this as a service. The main limitations are staff and space capacity, especially for non-teaching activities, as teaching takes priority (Senior Assistant Librarian, 2021, MacLean, 2022).

Future plans

Both ASC and Photographic Unit staff are keen that the academic community and other audiences are able to access, use and enjoy the collections, digitally and in-person. They are excited by digital technologies' potential to offer multiple routes into, and enriched experiences with, the collections, but enabling digital access is time-consuming and just one of many duties staff undertake. ASC staff recognise that use of the visualisers will only increase for teaching, research and inter-institutional collaborations, but new activities afforded by the visualisers will have to be balanced with existing demands on departmental spaces, services and staff (MacLean, 2022). The Photographic Unit photographers are keen to offer technologies such as UV imaging, 3D modelling and multispectral imaging as a service and would love to create enriched digital versions of selected collections to offer fresh perspectives on them, in the way that colourised WWI photographs and films have, but low staffing levels means that staff time is fully occupied with current service demands (McCann, 2021). Regardless of the challenges around digital activities, the Senior Assistant Librarian (2021) concluded, 'Definitely, there's an appetite for all that and I think that's something we should explore and try and capitalise what we can do as much as possible.'

The main finding for pattern books from this case was how ASC staff place the materiality of their collections at the heart of their teaching and engagement practices, and it was instructive to see how they use remote/filmed handling to facilitate study of documents' material properties. The archivists' undertakings to describe physical features of their textile heritage collections was also insightful. These findings are discussed in the analysis at the end of the chapter.

Natural History Museum

This case study investigated two digital access programmes within the Natural History Museum (NHM): the crowdsourced transcription of Library and Archives collections, and the mass digitisation of pinned insects, part of the Museum's programme to digitise all eighty million specimens in its care.[113] The mass digitisation of moths and crickets may seem far removed from digitising paper and fabrics, but the author was curious whether

[113] The term 'specimen' refers to any preserved animal or plant (or part of one) or geological sample.

pattern book digitisation could benefit from any of the technologies the Museum is employing to expedite its specimen digitisation, and indeed, whether they were advancing the digital work of NHM's Library and Archives department. The Natural History Museum originated as the natural history section of the British Museum, which relocated its the natural history collections to purpose-built premises in South Kensington (their current site) in 1881. The museum became an independent institution in 1963 and was renamed the 'Natural History Museum' in 1992 (Natural History Museum, 2024b). Today, the NHM is both a visitor attraction, attracting over five million visitors annually, and a research institution; it employs over nine hundred staff and approximately five hundred volunteers support visitor engagement and scientific and collections activities (Natural History Museum, 2024a, 2024c). A non-departmental public body, the museum is funded principally by government grant-in-aid to the value of £43 million annually for 2023-2025 (The Trustees of the Natural History Museum, 2023).

The Museum's mission is 'to create advocates for the planet', to fulfil its vision 'of a future where both people and the planet thrive'. Its strategic priorities for 2020-2031 include its intention to secure the future of its collections and transform natural history research through technology (The Trustees of the Natural History Museum, 2019, p. 7): the museum's forthcoming science and digitisation centre on the Thames Valley Science Park, due to be fully operational in 2031, is central to achieving these goals. The new centre will provide storage for collections (specimens and archives/books), conservation and digitisation studios, and research spaces furnished with leading technologies (Natural History Museum, 2021). NHM is committed to facilitating digital access to its entire collection of eighty million specimens as it believes that digitisation improves discovery, makes collections accessible to a wide audience and enables scientists to combine data from multiple sources, making their findings more rigorous (Popov *et al.*, 2021).

Central to the ethos and activities of the NHM is its collaborations with the international natural science community to establish access to global historical, geographical and taxonomic specimen data and fuel scientific research. Museum staff are involved in the long-running European Commission-funded *Synthesis* programme, which is developing services and standards to create the infrastructure for a single digital gateway to European natural science collections. They also contribute to *DiSSCo* (*Distributed System of Scientific Collections*), an umbrella programme for national natural science digitisation

programmes across Europe (Smith, 2022).[114] NHM's Library and Archives furnishes copies of journals and books to the Biodiversity Heritage Library (BHL), which provides open access to digitised biodiversity literature and archives (Pollard, 2022).[115] NHM considers these international databanks vital to research because, as Vincent Smith characterises it, each institution's collection is like one piece in a jigsaw puzzle, and the full picture, and new knowledge, only emerge when all the pieces are brought together (Smith, 2022).

Library and Archives cataloguing and digitisation

The NHM has been collecting books and archives since 1881. The Library and Archives now manages over one million items, comprising books, journals, artworks and archives. Archives document the management of the Museum and its collections, and staff activities, and include correspondence and research papers belonging to scientists who worked at the Museum (Smith, 2022; Natural History Museum, 2023). Library materials are catalogued in the Library's Alma-Primo library management software,[116] while archives are catalogued using CALM, which provides the required hierarchical structure. Library staff include the dimensions of volumes in the catalogue; recording dimensions of archive documents is more variable and depends on the item. Significant material features are described, for example, a remarkable binding, later annotations or evidence of ownership. In the past, books were rebound if their binding was in poor condition, but this is not current practice (Pollard, 2022). As is the case in many archive services, it has not been possible to catalogue all the collections to a level to maximise discovery and demonstrate their informational value, and many of NHM's newer scientists do not appreciate the richness of the material in the archive (Smith, 2022).

Prioritisation for the digitisation of books, archives and artworks is assessed against a formal series of criteria. The main criteria are usage, condition and online publication. If a document is requested regularly by researchers, staff may decide to digitise it. Fragile items are digitised to reduce wear. Copyright and IPR impact selection and unpublished manuscript material is largely avoided because of copyright concerns. The Library has its own digitisation studio and one dedicated, full-time digitiser, who takes around one thousand images per month. The digitiser liaises with similar teams across the institution

[114] See www.synthesys.info and www.dissco.eu (accessed 19 Aug 2024).
[115] Biodiversity Heritage Library www.biodiversitylibrary.org (accessed 19 Aug 2024).
[116] 'Library' is used here as shorthand for the Library and Archives department.

to ensure that consistent standards are employed (Pollard, 2022). Collections metadata and digitised items are published on the NHM's online collections discovery portal.[117] Digitised collections can be browsed via a gallery or accessed via the relevant item catalogue records and users are offered a choice of IIIF-compliant viewers (Cardy and Pollard, 2023).[118] Library staff do feel that the portal software's limitations restrict how they can share their collections online, but the department does not have the resources to build a bespoke system (Pollard, 2022).

In 2019, the NHM created a new role of Digital Special Collections Librarian to help deliver digital scholarship projects within the Library and Archives.[119] DUNA (Digitally Unlocking Nature's Archive), the department's project to crowdsource machine-readable and searchable transcriptions of handwritten archives, was launched in September 2020 on the science-based Zooniverse crowdsourcing platform (Pollard, 2022). For each potential document, staff had to carefully evaluate the legibility of the handwriting and review the layout of the text, as the text must be transcribed in the same order by all transcribers for the checking to work. For Phase One, the Library uploaded digital images of almost two thousand document pages. Most material was in English but texts in other languages were offered too. Zooniverse shows each page to multiple transcribers; a page comparison tool compares all the returned transcriptions and decides on a consensus version (Cardy and Pollard, 2023). As contributors register with Zooniverse, not with NHM, their motivations for participating could only be gleaned through comments left on the NHM's Zooniverse messaging forum. Some young people got involved to accrue volunteer hours for Duke of Edinburgh awards or boost their CV (the project ran during the pandemic, when in-person volunteering opportunities were largely non-existent), while volunteers for whom English is not their first language wanted to practice their English transcription (Pollard, 2022). Building relationships with contributors through the forum was an important element of the programme (Cardy and Pollard, 2023).

The Library paused DUNA in February 2021, to review what had worked and not worked and evaluate how to take crowdsourcing forward. Insufficient staff capacity was an issue. Staff wanted to ensure that there was always material prepared for volunteers to work on,

[117] NHM portal https://www.nhm.ac.uk/our-science/services/library.html (accessed 19 Aug 2024).
[118] Depending on the item, users can choose between NHM's standard viewer, the Internet Archive viewer or the Universal Viewer, an open source, community-led tool used by several heritage institutions, including the NLS and British Library, see https://universalviewer.io (accessed 19 Aug 2024).
[119] This role is half-time digital scholarship work and half-time collections work.

but found it difficult to keep up with demand; they also ended up with a huge backlog of transcribed material to process. It was clear the volunteer community relished the challenge of transcribing the documents, and even complex material got transcribed, if more slowly. The main elements which contributors struggled with were words which could not be guessed from the context, such as technical terms and species, place and personal names; abbreviations; and unfamiliar handwriting conventions (Pollard, 2022; Cardy and Pollard, 2023).

Specimen cataloguing and digitisation

Prior to 2014, specimen digitisation in the Museum was small-scale and project-led. One project digitised and transcribed the NHM's paper accession ledgers and imported the data into the museum's collections database, to provide baseline metadata for the digitised specimens. But staff have found it deeply problematic to reconcile the register entries with individual specimens, especially for the pinned insect collections because, while the accession entries record provenance, essential data about each specimen is recorded on labels attached to the insect's pin. A specimen can acquire multiple labels over time (one encountered during digitisation had fourteen), recording incremental changes in identification or taxonomic description and supplementary information supplied by researchers (Smith, 2022). In 2014, recognising the demand within the scientific community for digitised collections data, the NHM established an institution-wide, mass digitisation programme to digitise all its specimens, from the smallest insects to dinosaur bones, as well as plants, and geological objects from Earth and beyond. 'Digitisation' covers a spectrum of activities, from metadata conversion, through 2D and 3D imaging, to detailed analyses like microscopy, chemical analyses and DNA sequencing that generate digital data (Popov *et al.*, 2021, p. 6; Smith, 2022). This case study focuses on the 2D digitisation of the thirty-five million insect specimens, as this is the method most relevant to this study.

The mass digitisation team has developed a suite of techniques, software tools, algorithms and scripts to automate tasks such as metadata management and image processing, but workflows still require considerable staff input. For example, barcodes, and latterly, QR codes, are used as unique identifiers for specimens and as an efficient way to encode regularly occurring elements such as species names and geographical locations, but staff have to manually insert all the barcode labels into the trays of specimens prior to digitisation (Allan *et al.*, 2019; Smith, 2022). Insects catalogued at tray level are scanned

in their storage drawers; an algorithm segments the drawer scans into sets of images, each containing one insect and associated metadata barcodes. Individually described pinned insects are removed from their containers and photographed one by one. When digitisation started, the digitiser had to remove the metadata labels from the pin, lay them out in a tray beside the specimen and barcodes, photograph everything, reassemble the labels on the pin and return the specimen to its container (Figure 34 shows a set of metadata labels and a QR code laid out for digitisation with a specimen). Now computer vision is streamlining the process, as the digitiser fans out the labels on the pin and uses an array of six cameras to photograph the specimen and labels from all angles. This has had a notable impact on throughput. When the labels are removed, a digitiser can process 200-250 specimens per day, but the computer vision set-up enables them to image 700-1000 specimens daily (Smith, 2022). Once the specimens, labels and barcodes have been imaged, automated processes name the files, read the metadata, convert it into metadata elements, import it into the collections database and link the catalogue records to the digital images. Transcription software transcribes printed and handwritten specimen labels; handwritten labels which it cannot read are transcribed manually. Initially, commercial and in-house tools were used to extract the data from the imaged barcode labels, but now computer vision does this task (Allan *et al.*, 2019; Smith, 2022).

Figure 34. Digitised Phareas burnsi Grishin specimen with catalogue labels and QR code (NHM 012824360, CC-BY)

Data standardisation is key to sharing and analysing scientific data and NHM staff devote considerable time to developing technical standards to facilitate the exchange of natural science collections data (Smith, 2022). Furthermore, standardising historic locations to modern latitude and longitude is slow and complicated, as NHM georeferencing specialists have to pin down descriptive site locations (e.g. the bend in the River Kelvin half a mile east of Garscube Bridge) and reconcile superseded place names and countries with their modern equivalents (Allan *et al.*, 2019; Smith, 2022). The NHM's data portal, built in-house, provides public access to specimen collection metadata and digitised datasets; the data is also published on the National Biodiversity Network, a portal for UK natural science data, and the Global Biodiversity Information Facility (GBIF) portal.[120]

Future plans

The mass digitisation team's main challenge is to increase throughput and they have been experimenting to see whether robots, trained using artificial intelligence, could transfer pinned insects from their trays to the digitisation holder and back. As well as potentially enabling digitisation to run twenty-four hours a day, the robots would free staff to concentrate on essential pre-digitisation tasks. However, robotic assistance will be a long time in development (Smith, 2022). The team are also exploring ways to take 3D images of insects. Although many researchers focus on metadata, a proportion study the specimens and their needs are not well served by the single-angle, overhead shots the digitisation programme supplies. To address this, NHM has been developing techniques with the UK's national synchrotron science facility Diamond (a type of high-energy particle accelerator) to generate high resolution, 3D images of specimens (Davis, 2021). The Natural History Museum is also working on a programme to fund and set up regional digitisation hubs, which will enable local and regional organisations across the UK to digitise their natural science collections. NHM recognises that these collections of often very local specimens are critical to understanding how biodiversity has evolved across the country, and also that few of their custodians have the resources to make their collections available digitally, so the hubs will provide the necessary facilities, training and support (Smith, 2022).

The Library and Archives is developing its crowdsourced transcription activities, which it sees as integral to its digitisation programme. Staff do not want to publish digitised

[120] NHM data portal https://data.nhm.ac.uk, National Biodiversity Network https://nbn.org.uk and GBIF www.gbif.org (accessed 19 Aug 2024).

handwritten documents on the Library website without a transcription, so they need to expand the department's capacity to undertake all the preparatory and post-transcription tasks associated with DUNA in a timely manner, to avoid a backlog of digitised items or transcripts awaiting processing. The department has secured internal funding for a new, one-year post of Crowdsourcing Transcription Co-ordinator to resume DUNA and they will test how crowdsourcing can become a routine activity within the department (Pollard, 2022). In addition, as some library collections are scheduled to be moved to the new science centre, staff will be occupied in planning their transfer.

The Library's success with crowdsourcing shows that this could be an avenue for transcribing dye recipe books and furthering research into historic dyeing. The mass digitisation team's use of computer vision, barcodes and programming to extract and process metadata and insert it into catalogue records suggests possibilities for tackling retro-conversion. A striking feature of this case was the difference in the technologies each department is applying in their digitisation workflows. NHM's initiative to share its expertise with smaller museums is noteworthy; the archive sector would benefit from a similar model.

National Library of Scotland

The National Library of Scotland (NLS) was established in 1925 to assume custodianship of the non-law collections of the Library of the Faculty of Advocates, which had presented its extensive collection of books, pamphlets, manuscripts, maps and sheet music to the nation (National Library of Scotland, 2023; The Faculty of Advocates, 2023). The NLS is one of six legal deposit libraries in the United Kingdom and Ireland and is a non-departmental public body. It derives almost all its core funding from grant-in-aid from the Scottish Government (just over £17 million in 2021-2022). In 2022, the Library's holdings consisted of over 35 million items; it employs approximately 324 staff (National Library of Scotland, 2022). Its strategic priorities for 2020-2025 include safeguarding collections, improving access and supporting learning, research and discovery, while its mission is 'To enhance Scotland's international reputation by making a significant contribution to global knowledge and the memory of the world'. These are intended to help the NLS to fulfil its vision 'To create opportunities for people to participate in Scotland's rich cultural life as one of the leading national libraries in Europe' (National Library of Scotland, 2020b, p. 8).

Catalogues and discovery

NLS uses several systems to manage and document its physical and digital collections. Printed books are catalogued using the library management system Alma, archives and manuscripts are catalogued in ArchivesSpace, an open source, web-based application, and sound and moving image material is documented using Filemaker Pro. Discovery software pulls data from all these systems into the public discovery interface. In the discussion which follows, these resources are collectively referred to as the library catalogues. A digital object database (DOD) is used to document and manage digital and digitised material; at the time of the interviews in Spring 2022, the Library was in the middle of designing and building a new digital asset management system (DAMS) to replace the DOD (Campbell and NLS staff member, 2022). As is the case in many archives and libraries, not all collections are catalogued, or at least, not in detail. In 2015, the NLS committed to fully listing its holdings by 2025 by delivering a programme of 'online listing, cataloguing and discovery work that makes visible all of the Library's special and hidden collections' (National Library of Scotland, 2015b, p. 6).[121] The Library has also been running a thirty-year programme to transfer information from paper-based catalogues into its digital databases, with work nearing completion in 2021 (Campbell and NLS staff member, 2022).

The inclusion of information about documents' material properties in catalogue records has varied over time and across departments. Since 1990, descriptions for all Scottish published books note object dimensions and the presence of illustrative content; prior to that date, physical properties were only usually recorded for rare books. A small number of significant manuscripts have been documented in great physical detail, but generally, archives and manuscripts have fairly basic records, with minimal or no material information recorded. Library conservation staff compile detailed notes about each item they treat, including information on material features, but their data is not added to the catalogue record or visible to staff or the public (Campbell and NLS staff member, 2022).

Catalogue records are amplified and ambiguity addressed by the use of name, place and subject authority records. The Library of Congress name and subject headings are the main thesauri used, despite being awkward to use, because they create strings of subject

[121] The Library defines 'hidden' collections as 'material held by the Library but not able to be found by users due to insufficient cataloguing and/or a lack of exposure in electronic form' (National Library of Scotland, 2015a, p. 5).

terminology, rather than separate keywords, and employ American spellings.[122] Latitude and longitude references are included in place name terms. In the DOD, staff also use the *Getty Thesaurus of Geographic Names* (TGN) and the *Getty Art and Architecture Thesaurus* (AAT), which provides terms for form, genre and keywords. As the AAT uses simple keywords and not search strings, it is easier to apply and search. Metadata staff acknowledge the tension between adhering to international library descriptive standards and enhancing discoverability (Campbell and NLS staff member, 2022). Campbell observed, 'There's a lot, I think, that we could bring from what's done in the DOD into our actual description. I think there's a lot of the vocabularies in use in the DOD that I think we should have more freedom to use in our other catalogues.' (Campbell, 2022).

This more flexible approach to the DOD has been extended to catalogue descriptions, which are often more comprehensive than the corresponding entries in the library catalogue. Staff have taken the decision to reduce the technical terminology in DOD descriptions for medieval manuscripts, to make them more comprehensible and less intimidating to non-specialists (NLS staff member, 2022). While the desire to be inclusive is commendable, removing technical terminology may create problems for researchers who require exact technical information. Those cataloguing pattern books and textiles face a similar dilemma. As discussed in chapter 6, knowledgeable textile researchers desire pattern books and textiles to be described precisely using industry terminology, but other researchers may be unfamiliar with the terminology or find that browsing is hampered by search requirements to use precise terms, leaving institutions to decide whether, and therefore how, to accommodate everyone's preferences. The NLS' dual approach has arisen because the DOD is completely separate from the library catalogues and metadata in the two systems is not synchronised or linked, or data copied from one to the other. Providing two versions of the metadata is one way to accommodate different user requirements but, as there are no hyperlinks or signposts pointing library catalogue users to the digital gallery (the public face of the DOD) or vice versa, users cannot move easily between the two sets of metadata and may not know that a second version exists (Campbell and NLS staff member, 2022).[123] It is easy to understand how this situation arose, but

[122] An example of a subject string is 'Scotland-History-1660-1688' instead of 'Scottish history'.

[123] An example is the Marjory Fleming collection (NLS MSS.1096-1100). The listing on the digital gallery (https://digital.nls.uk/100989212, accessed 19 Aug 2024) provides a brief biography, information about annotations in Marjory's diaries and lists the writer and recipient of each letter, details absent from the library catalogue record. The catalogue explains how the collection was acquired and signposts the viewer to a published facsimile of the material (https://manuscripts.nls.uk/repositories/2/resources/19193), information not offered to the gallery viewer. Neither source acknowledges the existence of the other.

writing and maintaining two sets of data for one document is time-consuming, and, as the British Library discovered when its systems were taken down by cyber-criminals in October 2023, potentially problematic to restore if systems fail.

The DAMS implementation project has provided staff with an opportunity to review how metadata is managed and information signposted to users. The Digital Transition Manager (2022) is keen that the DAMS is used to manage technical information about the digital objects, while the catalogue contains one descriptive record for each item, covering all its versions; the records in the DAMS and the catalogue will be linked. This will end the need to maintain two catalogue records for documents which have been digitised, but means that staff will have to decide how to fulfil both specialist and non-specialist users' requirements in one description. Carol Campbell would like to see library sector practice for cataloguing digital versions of physical books and archives change. Currently, digital versions are described as if they were the physical document they represent; Campbell believes catalogue entries should instead list the digital object's specific characteristics and information about its creation, an approach which would align with practice for other items, she argues. She observed, 'in the future more and more people will be […] interested in the history of that digitised object, its metadata, and I think at the moment we're not serving that future need very well.' She also considers the term 'surrogate' demeaning and would like digitised items to be given equal standing to physical versions (Campbell, 2022).

Metadata staff hope that the DAMS will provide greater flexibility when it comes to putting material online. Currently, all items being published online need to sit within one of the digital gallery's categories, so if an item or collection does not fit into an existing grouping, it is less likely to be digitised, or it will be digitised but not published online. Being able to link library catalogue records directly to digitised records should remove that restriction (NLS staff member, 2022). Staff also hope the DAMS will streamline the upload process. With the DOD, collections are bulk uploaded so, rather than publishing a collection piecemeal as sections of it are processed, the whole collection has to be digitised, described and rights-assessed, then put online as a block. If staff subsequently want to correct or expand the metadata for one item in a collection, the whole collection has to be taken down, amendments made and then everything put back up. As a result, changes are not made. The DAMS will enable single records to be uploaded or corrected as required.

Digitisation

The NLS has been digitising its collections since the 1990s. Until about 2018, a significant proportion of the Library's digitisation work was undertaken by external companies. However, NLS decided that it would be more beneficial long-term if digitisation was delivered in-house and staff's expertise and skills fostered; now most digitisation is done by NLS staff (Digital Transition Manager, 2022). In 2015, NLS launched an ambitious undertaking to provide access to one-third of the Library's holdings digitally by 2025 (National Library of Scotland, 2015b). This one-third will be composed principally of digital legal deposit publications and digitised material will form less than 5% of the total, but 5% still represents a large quantity of records. The mass digitisation team is responsible for digitising paper-based collections. The Library is keen that the digitised collections reflect the breadth of the institution's holdings, and selection is informed by user feedback, analysis of collections use, the Library's selection criteria policy and input from curators, who propose collections based on their knowledge of audience interests or awareness of collections which are largely invisible to readers and which would benefit from enhanced discoverability. Early digitisation programmes focused on visual collections and family history sources; subsequent programmes have prioritised printed books and single sheet maps. The Library has actively included twentieth-century material where possible, facilitated by the Open Government Licence for public sector information (Digital Transition Manager, 2022).

The 2025 digital access target has obliged the digitisation team to streamline its approach to increase throughput. Previously, staff had retrieved single items from multiple shelves across the stores, but they realised that, to maximise throughput, they needed to digitise entire shelf runs. As they remain committed to meeting audience interests, they undertook a major exercise to identify collections which would interest audiences, were in good condition, had quality catalogue records and were stored in one location, and these are being prioritised. Mass digitisation in NLS is guided by international imaging standards but does not adhere tightly to them, as its aim is to create 'good enough' copies for effective digital reading access, rather than high quality facsimile images for exhibitions or publications. Everything is imaged in colour, even newspapers (Digital Transition Manager, 2022). The digitisation system is colour calibrated every day and the readings retained for reference. Calibration data is not published online, as this would increase file sizes, but it can be supplied to users on request (Digitisation team member, 2019). Optical character recognition is carried out on all printed material (Ames, 2022). The mass

digitisation programme's approach to material properties has evolved. Initially, digitised pages were cropped inside the page boundary, excising the gutter and page margins from the processed image set. In 2019, this was amended and page images are now cropped outwith the page boundary, allowing users to see the entire page and signs of handling and wear on the corners or other edges (Digitisation team member, 2019).[124] Books and documents are digitised in their entirety, including blank pages and covers, but spines are not imaged, as the book digitisation cradles do not facilitate this (Digital Transition Manager, 2022). The Library is sensitive to variations between different copies of older books and reader interest in annotations and marks of ownership and will often digitise all the copies it holds of one title. High resolution images and zoom levels in the digital gallery enable viewers not just to read text but also to scrutinise details such as imprints on wax letter seals and chain lines within paper. Staff have noticed that, once an item is digitised, requests to access the physical original increase (Campbell, 2022).

Future plans

Being forced to rely on digital resources and services during the pandemic has prompted the Library to evaluate whether the items it is digitising actually meet users' needs and create positive engagement, or indeed any engagement. This evaluation arises not so much from concern that digitised resources are failing to meet audience requirements but from the Library's desire, expressed in its current strategy, to connect with more, and more diverse, audiences (Digital Transitions Manager, 2022). NLS is also developing its role as a research institution. It launched its digital scholarship service in 2019, which makes data from Library collections available in multiple machine-readable formats and allows researchers to analyse the data through text and data mining, machine learning methods and other techniques. The datasets are created using digitisation, the application of OCR, or by amalgamating metadata and structuring it in different formats, all resource intensive processes (Ames, 2022).[125] The Library's annual fellowship in digital scholarship, inaugurated in 2020, aims to foster research based on these datasets (National Library of Scotland, 2020c).

[124] The different practices can be observed by comparing digitised pages of Viscount Molesworth's *Account of Denmark* (shelfmark ABS.1.75.233, https://digital.nls.uk/107116260), which are missing their margins and gutters, with *Lay of the Last Minstrel* by Sir Walter Scott (shelfmark MS.50705, https://digital.nls.uk/239833406), where they are visible (accessed 19 Aug 2024).

[125] The datasets are published on the Data Foundry https://data.nls.uk/.

The Library's catalogue demonstrates the value of their investment in creating authority records and adding subject terms to records to standardise descriptions, aid discovery and connect related records across the catalogue, and it is clear that this approach could help researchers discover and evaluate pattern books in catalogues. Maintaining two versions of catalogue records seems unsustainable, and it is unsurprising that NLS plans to stop this when the new DAMS is operational. Their dilemma about the inclusion of technical language resonates for textile collections and is an issue archivists will have to address to meet the needs of the majority of textile researchers.

Southwark Archives

The inclusion of a local authority archive service in London as a case may seem odd, given there are local government archives in Scotland. Southwark Archives was chosen because it is the custodian of the Crutchley collection, the business archive of an eighteenth-century Southwark wool dyer which, as discussed in chapter 1, has been inscribed on UNESCO's UK Memory of the World Register. Beyond its interest in this specific textile collection, this case study explores the challenges a small service like Southwark Archives faces as it tries to fulfil its aspirations to care for and enhance access to, not only one special collection, but all its collections, when it is constrained by the limited resources at its disposal and the circumstances in which it operates. Southwark Council's heritage and cultural provision includes lending libraries, a museum service, the local studies and archive service, and a borough art collection (Southwark Council, 2019). Like most local authorities in the UK, reduced central government funding and rising costs present the authority with significant budgetary pressures (Southwark Council, 2023). Southwark Archives started life in 1965 as part of the local reference library. In 1972, a separate local studies library was established and became known as Southwark Local History Library and Archives. Council records formed part of its holdings but, until 2010, although an archivist was employed on the staff, the service was always managed by a librarian and all collections were organised according to library methodology. In 2010, Southwark Council appointed its first archivist to the post of service manager and in 2020, the service was renamed Southwark Archives (Council staff member, 2022).

Southwark Archives is situated within the John Harvard Library, one of the Council's lending libraries. There are four members of staff. The service manager's role combines day to day service delivery (invigilating the searchroom, fetching documents, assisting

users) with strategic policy and collections development, and collection care. Limited staff capacity and resources mean that staff need to carefully consider the advantages of potential accessions before accepting them. Collections are distributed between three stores, only one of which is located inside the borough; keeping track of material as it is moved back and forwards between stores and the searchroom is challenging. Since the archivist's appointment as service manager, library methodologies have gradually been replaced by archive practices and the service's role as custodian of unique records has been emphasized. The name change reflects that shift, as well as the desire for a shorter, more memorable, name.

Investment in the archive service over the past ten years has been impacted by Southwark Council's need to find a new home for its Cuming Museum, after a fire in 2013 largely destroyed the former Walworth Town Hall, which had been repurposed as the Museum's exhibition and learning space. Fortunately, the museum store was located elsewhere and its contents were unharmed (Southwark Heritage, 2016). The Museum was 'absolutely loved' by the residents of the Walworth neighbourhood, who saw it as *their* museum, so the Council was under pressure to replace it (Council staff member, 2022). Consequently, the Council's *Libraries and Heritage Strategy* 2019-2022 focused on actions to provide public access to the museum collections and specific undertakings to improve the archive service were limited to achieving archive accreditation and publishing catalogue data through TNA's Discovery portal (Southwark Council, 2019). While the Council was understandably preoccupied by the museum's needs, those involved with the Archive felt that councillors and managers found it easier to understand what the Museum is for, especially as the Archive had long been seen as a type of library (Council staff member, 2022). The public consultation underpinning the strategy did identify that 58% of respondents are interested in learning about local history and 38% in attending collections-based exhibitions, but it also found that 40% of respondents did not use the borough's heritage and archive services because they were unaware of them (Southwark Council, 2019, p. 19).

The pandemic had a significant impact on Southwark Archives' service delivery, not least because it coincided with building works in the John Harvard Library, which remained closed to the public for twenty-one months. During the pandemic, archive staff were supposed to have access to the building to undertake collections research and scan documents for the public; however, due to asbestos abatement work, they were excluded for almost a year. With limited catalogue data available digitally and just a small selection

of photographs and films online, public access to the collections between 2020 and 2022 was minimal. The Council has recognised that the virtual absence of digital access is not sustainable long-term and now that the replacement museum (Southwark Heritage Centre) is operational,[126] the Council is starting to address the needs of the archive service. Its 2022 capital funding bid contained a number of strands specifically focused on the Archives' requirements, with the intention of making it fit for the twenty-first century. A new library and heritage strategy is in development and Archive staff hope that commitments will be more evenly balanced (Council staff member, 2022).

Catalogues and discovery

Southwark Archives currently uses Microsoft Excel to record catalogue data and manage locations and has no online catalogue. Collections information available remotely is limited to a few subject guides on its website and a 1992 guide to the collections and some annual accession returns in TNA's Discovery catalogue, contributed through TNA's Access to Archives retro-conversion programme. The brevity of the entries in Discovery confuses users, who find it difficult to distinguish between a listing describing a single item and one pointing to a collection comprising twenty boxes. Paper catalogues, mainly compiled by the British Records Association in the 1980s and 1990s, can be consulted in the searchroom, but they do not conform to modern standards and are not easy to navigate (Council staff member, 2022). Data collected through CIPFA's surveys of visitors to UK archives between 2014 and 2018[127] shows that only about one third of users live in Southwark. The majority come from other parts of London, with a significant minority resident in adjacent counties, such as Buckinghamshire. While staff are keen to address local residents' absence, they do not wish to neglect the needs of existing audiences, so clearly, as much catalogue data as possible needs to be accessible online, ideally accompanied by a selection of digitised records (Council staff member, 2022).

Digital access

Being able to offer digital access to catalogue data and collections is a major strategic priority for Southwark Archives, but it has struggled to secure the necessary resources. Staff have submitted applications to several schemes to secure funding to digitise the

[126] Southwark Heritage Centre and Walworth Library opened in April 2021 as a blended museum and library space, displaying museum collections beside lending library services (Heren, 2021).

[127] CIPFA (The Chartered Institute of Public Finance and Accountancy), in association with the Archives and Records Association, conducts a survey of onsite users of UK archives every eighteen months. It also runs surveys of distance service users.

popular Southwark photographic collection, which is being damaged by excessive handling, but its bids have been unsuccessful (Council staff member, 2022). Staff tried publishing some digitised photographs on the museum's online catalogue but the large file sizes caused the catalogue to crash, so they were removed. Publishing them on the Borough Photos website, which allows the public to view and purchase copies of historic photographs of the London area, is being explored as an alternative route (Council staff member, 2022).[128] About half of the Archives' film collection is available online through London's Screen Archives[129] and a few are available via the BFI Player (Southwark Local History Library and Archive, 2019). Other than these audio-visual materials, the only collection to be digitised is the Crutchley Archive. Funding from the National Manuscripts Conservation Trust enabled Southwark Council to employ a local conservation studio to conserve and digitise the most fragile of the Crutchley volumes. The conservators photographed the volumes before any work was done, to document their condition and preserve a visual record of their original form, as they were being disbound for conservation treatment. Once conserved, the volumes were photographed again to create access copies. How to publish the digital access copies online is still to be decided (Council staff member, 2022). Having the Crutchley collection inscribed on the UK Memory of the World Register raises the profile of the service and the collection, but does not leverage funding to assist with the costs of conserving and caring for the fragile records or facilitating access to researchers keen to investigate the histories they preserve.

Materiality

The artefactual nature of archives is important to Southwark Archives and has informed how the Crutchley collection was digitised, with close attention paid to material aspects of the volumes and fabrics. A member of staff observed,

> there's so much potential information […] embedded in the physical object itself. Whether that's the nap of the fabric or some of the more complicated symbols that appear in one of them, or indeed, one of the recipe books […] is actually dyed red because that was one of the books that was being used

[128] The portal (https://boroughphotos.org, accessed 19 Aug 2024) was initiated by the London Archives Partnership c.2014. It is managed by digitisation and archives services firm Max Communications, and all the London Boroughs can sign up to use it. Revenue from sales is split between the company and borough which supplied the image.

[129] Managed by Film London, London's Screen Archives is a network of over seventy London-based organisations holding heritage film collections. It provides support for digitisation and preservation and offers public screenings and other engagement opportunities, see www.londonsscreenarchives.org.uk/about (accessed 19 Aug 2024).

> in the dye house. And so those kind of details really do need to get captured. (Council staff member, 2022)

While the material properties of the late-twentieth-century photographic collections are a lesser priority, staff recognise that users may be interested in which processes were used to produce the Victorian-era images. Joan Schwartz (2002) drew attention to the evidential value of the placement of photographs within photograph albums and a similar awareness underpins thinking about how photograph albums which have been donated to Southwark Archives should be approached:

> Those pieces of paper were arranged in a book in a certain way, for a certain reason and that's potentially going to be interesting. And […] what about the captions on the album? What if there are additions or subtractions? (Council staff member, 2022).

There is particular interest in the material diversity of the Archives' borough poster collection. Staff recognise that the posters present a rich body of evidence for printing technologies, visual design, advertising and political and social history. Camberwell Council's posters advertising events to celebrate a coronation[130] are printed on 'really terrible quality paper. Very, very thin, very scrunchy [with] really blocky ink', whereas the London Borough of Southwark's Silver Jubilee celebration events posters are on 'thick shiny glossy paper with multiple colours of ink and [are] very much more visually focused.' The Archives holds an A2-sized scrapbook of giant election posters, collated by a library staff member during the December 1910 general election. The posters have been folded multiple times to fit them into the book and pasted in. Tricky to unfold without ripping, they are 'big, bright, colourful with all kinds of political in-jokes and sloganeering […] really different from a modern political poster, but also intensely the *same*' (Council staff member, 2022). As the Liberal Party's social reforms of this era are part of the GCSE history curriculum, the Archives staff would love to digitise these posters and use them in school learning sessions. Their ambition is that the digital images convey a sense of the posters as material artefacts, rather than displaying them as disembodied images on the screen.

[130] Whose coronation was not specified in the interview, it was possibly Queen Elizabeth II's or her father's, George VI.

Future plans

The pandemic made it clear to staff and councillors that an onsite-only service model is no longer acceptable, enabling the Archive to embark upon digital access initiatives which have long been an unachievable aspiration, due to a lack of time, equipment and money. In the summer of 2022, the Library and Heritage section received capital funding from the Council to foster innovative activities, especially digital ones, and it was agreed that some of the money would be used to fund digitisation and digital development work. The photographic collection will be digitised, at least in part, and made available through the Borough Photos portal; a collections management system purchased; FindMyPast contracted to digitise some family history records; and a scanner purchased for digitisation work in-house. The Archives also hopes to secure seed funding to digitise the Council poster collection, especially as copyright is held by Southwark Council, and host the images on the Borough Photos portal. Southwark Archives and the museum service are keen to expand their offer to the local community, but neither site is well-suited for learning and engagement activities, so they are exploring the possibility of setting up a joint heritage research centre in an unused space within Council headquarters (Council staff member, 2022).

This case has emphasized that the smallest services face significant challenges as they endeavour to provide digital access to their collections and it underlines why the archive sector would do well to follow NHM's initiative to provide practical assistance to smaller services. The participant's enthusiasm for the material richness of posters was inspiring and a reminder that valuable material evidence resides in everyday items, not just elite manuscripts.

Sunny Bank Mills

Sunny Bank Mills Archive in Farsley, West Yorkshire, preserves records and artefacts from the former worsted weaving company Edwin Woodhouse & Co Ltd. The Archive was chosen as a case because the author was interested in the digitisation and access initiatives it has employed to enhance access to, and appreciation of, its extensive textile heritage collections. In 1882, Edwin Woodhouse purchased the Sunny Bank Mills, which had been built in 1829 to finish woollen cloth, and began spinning and weaving fine worsted wool cloth for men's suiting. Woodhouse's business and company name were acquired by William Gaunt in 1917 and although cloth production ceased in 2008, the site

remains in Gaunt ownership today (Moaby, 2021b). Owners John and William Gaunt have redeveloped the site as a creative hub and commercial business space. The historic buildings round the periphery of the site, including the combing shed, dyehouse and spinning mills, have been refurbished to provide office, studio and retail spaces and the Gaunts have established Sunny Bank Mills Gallery in the former cloth warehouse (Sunny Bank Mills, 2023c). The firm employed a large workforce and many local residents have personal or family associations with the works; Sunny Bank Mills' relationship with the local community is central to its ethos (Moaby, 2022).

When the mills closed, John and William Gaunt gathered up documents, fabrics and artefacts, uncertain what to do with them but anxious that this evidence of the mills' history should not be destroyed, the usual fate of such items. The Archive Curator, Rachel Moaby, who is a museum curator but not a textile specialist, was taken on in 2013 and, until 2023, was the sole archive employee (JonSP, 2013; Moaby, 2022). The Sunny Bank Mills Archive, located in the old warping shed, is a rare survivor among textile collections, as it remains within its original industrial context and all its historic textiles were manufactured onsite. Several other local mills have been converted into heritage sites, but they do not hold any records or artefacts relating to the manufacturing activity which took place within their premises. While Sunny Bank Mills is a commercial enterprise, the Archive is managed separately as a not-for-profit entity (Moaby, 2022). The business records include three hundred guard books full of textile samples, dating 1829-2008,[131] one hundred ledgers and cash books, and five thousand wool yarn dyeing recipe cards. There are also sixty thousand lengths of fabric, eight thousand fabric designs, and numerous photographs, weaving looms and artefacts (Sunny Bank Mills, 2023b). The environmental conditions for the collections and staff, volunteers and researchers who work on them are not ideal, as the warping shed can be chilly and its large, north-facing windows expose the collections, stored on open shelves, to high light levels. In January 2021, the Archive was awarded community archive accreditation through West Yorkshire Archive Service. Rather than pursue full archive accreditation, Moaby has decided to work towards museum accreditation, even though it means changing the legal name of the Archive and amending terminology used throughout its documentation, because museum accreditation provides

[131] The guard books were used as a type of reference system. They contain samples of all cloth produced, arranged by year, season or export destination.

access to funding and sector support, unlike archive accreditation, which offers no similar benefits (Moaby, 2021a; 2022).

A team of volunteers provides valuable support with preservation, cataloguing, research, exhibitions and stewarding in the Archive. Income is generated by charging fees for guided tours, group visits and research access, but development is largely dependent on external funding (Moaby, 2022). The Archive has secured funding from the National Lottery Heritage Fund and Historic England to create educational and community learning resources, including resources to engage primary school children with Farsley's history and heritage (JonSP, 2018), and undertake the *Weaving the Web* project (2022-2023), which focused on digitisation and digital access. Moaby ensures that all activities and content generated through external funding are sustainable beyond the life of the funded project, so that the Archive derives maximum benefit and value (Moaby, 2022). Digitisation workshops offered free as part of *Weaving the Web* proved very popular and will continue as a chargeable activity. Having developed expertise in 360-degree spin photography, the Archive intends to offer this as a commercial service (Archive Digital Curator, 2022).

Catalogues and discovery

Belief in the importance of the materiality of the collections underpins digitisation, access and cataloguing. The curator holds the view that basic catalogue lists (e.g. document title, covering dates, reference) are not helpful for users. Therefore, although basic lists have been compiled to manage the collections, when the volunteers undertake condition surveys of items in the collection, they record as much detail as possible, including the design and colours of the textiles. The Archive's primary audience is the local community, followed by anyone with an interest in textile heritage and commercial designers who use the archive for design inspiration. This combination of specialist and non-specialist users means that, like the NLS, Moaby has had to decide how much specialist terminology to employ in the catalogue: as access for the local community and inclusion are her first priorities, she has chosen to minimise technical language. External access to the collections is, in any case, mediated through Moaby, so she can guide experts to what they require. The Archive uses Microsoft Excel for cataloguing; Moaby would like to make the catalogue available online, but collections management software is beyond the Archive's means and even if it were affordable, the time investment required to migrate the existing catalogue from Excel is not within the service's reach (Moaby, 2022).

Although growing digital access is a priority, providing in-person access to the Archive and its collections remains central. Guided tours run every Saturday and private group visits and individual research visits are offered. The curator considers the collections as the local community's history and wants to make items visible by displaying them, but faces the perennial heritage question of balancing access and preservation. Protecting the textiles from excessive light exposure is a particular challenge and presenting items within drawers which can be open/closed is being considered (Moaby, 2022; Sunny Bank Mills, 2023a).

Digitisation

Creating digital access to the collections has been dependent on external funding, as there has been insufficient time, financial resources and IT capacity to undertake any digital photography in-house. In 2018, the Archive secured funding to create a 360-degree interactive tour of the archive space, which enables viewers to move round the room, bring up information about selected items, such as destination label stencils, hear a loom in action and listen to an oral history recording made by a former employee. 360-degree photography has subsequently been utilised to create a permanent record of spaces within the mills earmarked for demolition, such as the finishing and pressing rooms. The machinery has gone but remaining fixtures and old signage evoke their past functions.[132] Onsite visitors can also experience these disappeared spaces through virtual reality (VR), as a VR headset was purchased through the *Weaving the Web* project. This has proved a very successful way to engage visitors with the heritage of the site, especially teenagers and young adults, who are sometimes less ready to be enthused (Moaby, 2022).

In 2022, the archive curator decided to extend the use of 360-degree imaging to capture fifty artefacts, textile and documents from the collections as part of *Weaving the Web*, to improve the onsite and online accessibility of the archive collections and space. The suspension of public onsite access to the collections and site during the Covid-19 pandemic had highlighted the lack of digital access. Rachel Moaby wanted not only to build up a body of digital resources, but also to strengthen the resilience of the archive by making it more accessible to, and inclusive of, the local community (Moaby, 2022; McMaster, 2023). Project funding paid for equipment, advice from a professional photographer and

[132] For the 360-degree tours, see www.sunnybankmills.co.uk/heritage/resources (accessed 19 Aug 2024). The website provides a brief history of each room and prompts for exploration.

the post of Archive Digital Curator.[133] The digital curator, who worked one day a week, made the 360-degree views of selected artefacts and ran the digitisation workshops. A core element of *Weaving the Web* was the involvement of students at the West Specialist Inclusive Learning Centre Powerhouse.[134] The students, who have additional needs, usually undertake placements with local employers as part of their learning programme, but during the pandemic they were limited to virtual learning. *Weaving the Web* offered the students the opportunity to learn new digital skills and work with the Mills' web designers to make the website more accessible. They also helped curate the online gallery of digitised artefacts, designed the project logo and made merchandise (Moaby, 2022).

The 360-degree digitisation process is laborious, as objects are placed on a turntable within a white tent and photographed from all sides (excluding the top and bottom) using a DSLR camera on a tripod (Moaby, 2022). The images are processed using the Object2VR software to build an interactive model and are edited for appearance. The time required to image each object varied from twenty minutes to two hours. The archive curator did not want any object supports visible in the outputs, so these, and any shadows, needed to be edited out. Glass objects proved tricky to capture due to the lack of contrast between the object and the white background, and some had to be redone. This raised questions about what was 'good enough', as the team did not want to get bogged down trying to achieve the 'perfect' image. The team discussed the impact of photographing objects against the white background, without any context, rather than in the objects' display location within the Mill, but since the objects are no longer located in their original working environment, the team felt that their context had already been lost. Where objects are stored in boxes, the container has been imaged to show the contents in their immediate context, like the peg plans stored in a tobacco tin (Archive Digital Curator, 2022).[135] The intention was not to create a study resource but rather allow viewers to encounter the objects, gain a sense of what a dye cone or peg block looks like, and immerse themselves in the detail. The business records have not been imaged in their entirety. Either a selection of pages has been imaged so viewers can get a sense of the contents, as with the wage book and dye recipe cards, or the volume has been photographed closed and open at one fixed page and can be rotated in either position, demonstrated with the guard book and cash book. On the website, the 360-degree views are accompanied by a brief description of the object, its

[133] Funding was secured from NLHF and the year-long project began in January 2022.
[134] The West Specialist Inclusive Learning Centre Powerhouse supports young people aged 16-19 with additional needs to develop their functional skills, independence and employability (West SILC, 2023).
[135] See https://www.sunnybankmills.co.uk/online-archive/peg-plan-tin (accessed 25/09/2024).

dimensions and list of materials, rather than a full catalogue record. Tags group the images into categories, allowing viewers to browse similar items.

Weaving the Web included digitisation workshops, offered to the student collaborators, Sunny Bank Mills staff and volunteers, and the public. Participants were invited to bring along an object to digitise. They were shown how to create a 360-degree representation of it, and how to photograph it using photogrammetry and LiDAR tools on an iPhone.[136] They then compared the outcomes of the three processes. Each workshop included a discussion about the physical and digital representation of objects, during which participants were asked what they felt was gained or lost when an object is digitised. Most commented that the solidity of the physical object, its size and weight, was absent in the digital representation, while the digital version made them more aware of the object's colour, texture and shape. The archive digital curator recounted:

> One lady brought a coffee pot which meant a lot to her, which she was very careful with and which she did not like others in the household handling, in case it was damaged. Once it was imaged, she said she felt more relaxed about the physical coffee pot being handled, because she now had this digital version. (Archive Digital Curator, 2022)

One of the Sunny Bank Mills volunteers commented after their workshop:

> The workshop also sparked some really interesting discussions within the group, around how this technology can be used, the ethics of using this technology and the difficulty in conveying the more subtle or intangible aspects of an object, such as associated feelings, senses and memories […] . and how we connect with objects beyond the visual. (Moaby, 2022a)

These conversations made the Archive staff think about their responsibility as curators and how they represent artefacts digitally and prompted them to modify their approach; for example, they decided to include each object's dimensions in the metadata for the online

[136] Photogrammetry is similar to 360-degree spin photography and involves taking a series of photographs of an object from all angles and stitching them together using software. LiDAR (Light Detection and Ranging) uses pulsed laser light to measure variable distances to the earth, see https://oceanservice.noaa.gov/facts/lidar.html (accessed 19 Aug 2024).

gallery, to address viewers' difficulty in perceiving size digitally (Archive Digital Curator, 2022).

Future plans

Current digital work concentrates on visual access to, and experience of, the collections. Mindful that not everyone can access things visually, Moaby would like to find ways to enable people to engage with the collections using other senses. She is currently (August 2023) working on a funding application for a project which will improve access for people with low vision. Cloth is tricky to digitise because it is very difficult to capture the colours accurately, both because the camera perceives the colours in a particular way and because they change as the light changes within the archive space during imaging. The dye guard books present a particular challenge and the curator feels that it may not be worth digitising them, because the digital process will not do justice to them and their embedded fabrics. The only reason may be for preservation purposes. Moaby would like to improve the storage and working conditions by dividing the warping shed into a display area, workspace and storage area, but there are no plans to do this at present (Moaby, 2022). Since the interviews took place, Moaby has been appointed Heritage Director and the Archive Digital Curator has been appointed to the new post of Heritage Officer. Further digitisation is in scope and funding is being sought for a project based on Sunny Bank Mills' dye garden, in which plants traditionally used as textile dyes are grown.

Moaby's engagement with materiality, digital representation and the affordances of digital and physical versions of artefacts was thought-provoking. Like the University of Glasgow's filmed handling, the Archive's use of spin photography demonstrated the potential of dynamic, three-dimensional views as a means to communicate pattern books as material artefacts and allow researchers to explore their features.

Analysis of findings

The case studies have provided valuable insights into the role and delivery of cataloguing, how the spectrum of digitisation activities is being undertaken, questions relating to audiences and digital access, engagement with artefactual materiality, and operational factors which foster or hinder activity and ambition. Here, the findings for each of these areas are reviewed in turn and their implications and learning for textile company collections discussed.

Cataloguing

All the case studies underlined that it is essential to have good enough data about collections in a structured digital format to manage collections, support digital activities and foster discovery. This is, of course, not news. Back in 2002, a report commissioned by Resource declared, 'The future of the online archive services will be built on the foundations of cataloguing. No other activity is more important to the archives domain.' (Rudyard, 2002, p. 9). Yet, all too often, as staff within the University of Glasgow attest, cataloguing is viewed as a luxury, rather than a service-critical process. Cataloguing backlogs are endemic within the sector, not least because large-scale rescue of collections at risk in the 1960s-1980s, including textile heritage collections, was not supported by comparable resources to catalogue these records (The National Council on Archives, 2000; Sykas, 2001). A recent discussion of this issue on the Jisc archives-nra listserve in September 2023 prompted the following response from TNA:

> Cataloguing is a vital part of looking after archival collections. Catalogues not only help keep collections safer by providing a record of what an archive holds, but also allow researchers and members of the public to more easily find and engage with archival material. All archives would love to have a full catalogue of their entire collections but limited capacity and resources inevitably lead to cataloguing backlogs and uncatalogued collections. (Morris, 2023)

Given this difficult landscape, it is heartening to see how case institutions are committing resources to cataloguing where possible. NLS has a whole team committed to metadata creation and management. At Sunny Bank Mills, the Heritage Director spends one day a week working with a team of volunteers cataloguing the collections, while student volunteers contribute to collections cataloguing and research at UofG. But, as the archives-nra discussion suggested, the sector needs to advocate to employers and funders for greater support for cataloguing, not least because activities which these people frequently prioritise, namely digital access and audience engagement, depend on adequate collections metadata.

In addition to creating new catalogues, the case organisations are anxious to convert their historic paper-based catalogue records, or ones in unstructured Word documents, into a searchable digital format. Retro-conversion has to address the technical problem of converting the data and the intellectual conundrum of transferring information structured

for access via paper-based tools into a comprehensible digital form. I was very struck by the practice within entomology curatorship of storing key scientific data on labels on specimen pins, which must have hindered data retrieval and use. As reports on usage of NHM's digitised datasets highlight (Popov *et al.*, 2021), converting the label-based metadata into accessible digital data through the digitisation programme has been transformative for researchers and promoted the significance of NHM's specimen collections to a broad research community. The retro-conversion of archive and library data, while more straightforward to achieve, is, as the cases illustrate, also complex but critical. It is clear that there are no quick or cheap fixes. NLS has spent thirty years retro-converting its catalogues (Campbell and NLS staff member, 2022). In the early 2000s, initiatives such as Access to Archives (A2A) and the Scottish Archive Network (SCAN) were transformative, because they were funded national programmes open to all sectors, they produced standardised metadata and provided a single discovery point for the collections data generated, vital given that many services did not have the means to publish their collections data online at that date.[137] Unfortunately, since these programmes ended,[138] no similar initiatives to tackle retro-conversion has been formulated. Twenty years on, the case studies testify that archive services are still grappling to get catalogue descriptions (pre-digital and born-digital) and digitised material online. Southwark Archives and Sunny Bank Mills are currently dependent on Excel for cataloguing and collections management and have no means to publish their catalogue data. UofG finally acquired EMu in 2015, but it took staff four years to import and configure sufficient data to feel able to make the catalogue live (Ashworth and McCrystal, 2020, p. 3). There are recurring requests on the Jisc archives-nra discussion list for recommendations for low-cost collection management systems which can be implemented without access to skilled IT support, but few are forthcoming.[139]

[137] Discussion on Jisc's archives-nra listserve in September 2023 about cataloguing backlogs prompted observations about the success of these early initiatives. One archivist commented, 'These projects took the archive sector from being in the dark ages to having robust, structured descriptions online. It changed the way users accessed us […] A2A was a game changer.' (Doherty, 2023).

[138] SCAN's project phase ended in 2003 and A2A's in 2008. Contributors' data remains accessible online.

[139] Open-source tools like AtoM (www.accesstomemory.org/en/) and ArchivesSpace (https://archivesspace.org) are free to install and use, but require IT expertise to set up, manage and maintain (accessed 19 Aug 2024).

Discovery and access

The findings from the case services which offer online access to collections information or digitised material highlighted that it can be complicated to ensure that resources are discoverable and comprehensible for all the service's envisaged audiences. Prioritising one audience simplifies decisions about functionality and content, but may exclude others. For example, the search functionality, use of Latin nomenclature, data presentation and download options on the NHM's data portal provide its primary audience of scientific researchers with rapid, unambiguous access to the datasets they require, but are daunting for the curious browser. In the same way, technical conventions describing manuscript foliation and collation are essential for some users, but perplexing for others. The NLS' decision to reduce the amount of technical terminology in descriptions accompanying digitised manuscripts to make them welcoming to new audiences is understandable, and while NLS maintains a second, more technical description in its main Library catalogue, subject specialists are accommodated as well. But if or when NLS removes this dual cataloguing system, staff will have to decide whose needs to prioritise or find a way to serve everyone. This is a topic which is extremely pertinent to textile heritage collections. The textile industry uses precise, sector-specific terminology for products, tools, processes and record types and knowledgeable researchers prefer precise terminology in catalogues, so they can identify records and textiles relevant to their enquiry (Quye, Cardon and Balfour Paul, 2020, p. 161). Other categories of users, creative practitioners, for example, may want to browse holdings with no specific requirements in mind and be hampered by search boxes demanding exact terminology (Kaye, 2023). Wiltshire (2017, p. 226) advises that catalogues listing business collections 'should explain unusual terminology and be […] free from jargon and abbreviations'. Sector discussion and guidelines about ways to describe industrial and business records to accommodate diverse user requirements, or incorporate glossaries or suggested search terms to guide users, are currently limited; how these might be fostered is addressed in the project outcomes in chapter 7.

Materiality

Archival literature may not, until recently, have had a great deal to say about materiality, as discussed in chapter 3, but the case studies, and conversations with other cultural heritage staff, confirm that GLAM professionals are alert to the informational value of records' material elements and aware that audiences want to study physical features, and are questioning how best to convey material information digitally. Case participants discussed

the nature of the relationship between physical and digital versions of records and the historical value of material evidence. Carol Campbell (NLS) astutely recognises that future researchers will want to study the properties and history of digital objects, so cataloguers have a responsibility to document the unique characteristics of digital versions of physical books/documents, rather than treating them as physical objects (Campbell, 2022). It was fascinating to learn from the Sunny Banks Mills Archive that its digitisation workshop participants discovered they became more attentive to an artefact's colour, shape and texture when they studied its digital representation, but when they held the physical artefact, its size and solidity stood out. The participants' perception that the digital representation did not acquire the intangible associations enmeshed with the physical artefacts is also instructive (Archive Digital Curator, 2022; Moaby, 2022). The Southwark Council participant's observations about the rich social, political and technological information bound up in the paper, typeface and appearance of posters, ephemeral objects deliberately destined for a very short active life, were illuminating and thought-provoking (Southwark Council member, 2022). This conversation prompted the author to include two contrasting posters in her project workshop, *Exploring archives as physical artefacts,* which in turn inspired lively conversations among the participants about the impact of their material appearance. Case participants' reflections on materials and the role and affordances of digital objects are relevant for digitising and describing textile heritage records. When one opens a pattern book, the colours and textures of the fabrics command attention and it is easy to overlook the tangible and intangible material properties of the volume in which they are housed, and the evidence those properties contain about intended function, audiences or usage over time. Digital representations of pattern books and especially textiles effectively communicate some material properties, but not others, so custodians have to evaluate what information they want to convey digitally and how best to do so.

Digitisation

The cases demonstrate the diversity of techniques and tools heritage institutions are employing to provide digital access to collections; learning about them was inspiring and sometimes surprising, and suggested profitable avenues for textile heritage. The two digitisation programmes examined at NHM, for specimens and historic books and archives, presented an interesting juxtaposition. The NHM specimen digitisation team's use of technology to address the challenges of extracting and processing metadata and imaging small insects was impressive and it was surprising to learn that, given the effort

devoted to photographing millions of insects, many scientists are not actually interested in visually inspecting the specimens (Allan *et al.*, 2019; Smith, 2022), very different to textile heritage researchers. In contrast, NHM's Library and Archives' digitisation workflow is very conventional and replicates those employed by UofG, NLS and many other archives and libraries. Moreover, rather than transcribe documents using handwriting transcription software, the Library has turned to human volunteers. Both programmes offer potential approaches for textile heritage. For example, algorithms that fragment specimen tray scans into a series of images, each containing one specimen, could potentially be applied to pattern books, allowing researchers to move the samples virtually and compare similar designs. Computer vision tools could extract printed and handwritten textual data from these records; indeed, projects described in chapter 4 show how AI-based tools like Transkribus are already successfully processing handwritten text from travelogues and scientists' notebooks, albeit after significant preparatory work. Crowdsourcing transcriptions would be another route to obtain searchable digital text from records such as dye recipe books. Given that Zooniverse contributors have successfully transcribed obsolete scientific fish species names (Cardy and Pollard, 2023), transcribers may be willing to tackle redundant dye ingredients. As Mia Ridge (2023), Digital Curator at the British Library, observed in a recent conference keynote, digitisation opens up data to analysis and processing at scale, and this was apparent from the NHM's specimen digitisation. A body of transcribed dye recipe notebooks, supported by digital images of their pages and the fabrics attached to them, could support research into dyeing and printing, by facilitating the comparison of dyeing processes, say, or use of specific dye ingredients like madder or logwood.

The University of Glasgow's use of visualisers to livestream and film document handling for teaching and researcher access showed how video can communicate material properties of archives and books which are hard to convey through still photography, and offers exciting potential for pattern books. Facilitators can zoom in on physical details like fabric weave and describe fabrics' texture, or the feel of the pattern book pages, which audiences cannot ascertain remotely. Simply observing how the staff member interacts with the document gives the viewer a sense of the document's size, construction and the experience of handling it, for example, seeing that a volume is the size of the presenter's hand. Video would be an effective way to show how David & John Anderson folded and overlapped their letters in their design correspondence book (described in chapter 3). Similarly, Sunny Bank Mills' 360-degree views of archival documents and textiles allow audiences to look

at them from multiple angles, zoom in to read text or scrutinise details, and, in the example of the dye recipe cards, situate individual cards within the material context of their bundle.[140] The act of rotating the object by clicking the buttons or touching the screen might also engage the viewer with the physicality of the object (Green, 2018).

The cases also highlighted sustainability issues inherent with digitisation and digital access. Digital files need to be managed, stored and actively preserved to ensure long-term access and as digital collections grow and activities evolve, processes also need to evolve. For example, at NLS, rewriting catalogue descriptions for items in the digital database was possible when it was used to showcase a few treasures online; as a workflow to manage thousands of items, it is not sustainable. At UofG, in the past, small file sizes and limited digitisation activity meant that storing duplicate copies of files was not a problem, but now whole books are digitised and the digital cameras generate huge files, a new approach to retention is necessary, as the department cannot keep buying more server space. Holding vast quantities of digital data has environmental as well as financial implications, an issue of growing concern in the cultural heritage sector. Digital sustainability is discussed further in the next chapter.

Resources

One factor guiding the selection of cases for this project was scale of operations, as the author wanted to explore a range of services in terms of the resources at their disposal. The findings show, perhaps unsurprisingly, that for all the case institutions, regardless of their size, access to sufficient and appropriate resources, for example, equipment, skills, staff time and funding, is integral to fulfilling their objectives for digital access. A significant point that emerged was that the smallest institutions are reliant on external funds to get started with digital activities. Southwark Archives has no in-house digitisation capabilities and, until the Council intervened, had been applying, without success, to external funders for money to digitise its Southwark photographic collection. In-house digitisation only became an option for Sunny Bank Mills when NLHF funding enabled the Archive to purchase digitisation equipment, pay a digitisation consultant to provide advice and training, and employ a digitiser. Although the NLHF money has now been spent, with equipment now in place, ad hoc digitisation can continue. Although ASC has digitisation equipment and skilled staff in place, it is held back by lack of capacity and insufficient

[140] For the dye recipe cards see www.sunnybankmills.co.uk/online-archive/dye-recipe-cards (accessed 19 Aug 2024).

funding to pay for additional digitiser staff hours. Even when supplementary funding becomes available for digitisation, it can increase, rather than solve, capacity issues. As described in the case study, ASC's involvement in Wellcome-funded projects allowed the staff to digitise some of its medical collections but, because the time required for collections staff to retrieve, check and (un)pack the records being digitised was not factored into the projects, staff had to fit the tasks round existing responsibilities, augmenting time pressures. The consequences of limited funding on smaller services' ability to develop digital access, and views on how the better-resourced might support smaller services, as NHM plans to do through its regional digitisation hubs, are discussed further in chapter 6.

Conclusion

The case studies have provided an in-depth account from a spectrum of GLAM institutions of the ways in which institutional aims and priorities, audience requirements and operating environment impact how staff provide digital access to collections. Participants have explained what has worked well, things they would have done differently in hindsight and the circumstances which impede progress, not least capacity. This project recognises that adequate metadata is core to digital access, so it was important to hear how staff face difficulties in cataloguing new collections, converting existing descriptive data into digital format or enhancing digital collections access through linked data. NLS's catalogue shows how a network of subject and authority terms can support browsing and discovery; this topic is explored further in the Glasgow School Art case study in the next chapter. The cases have showcased a multiplicity of digital approaches for capturing visual views of books, documents and artefacts and for converting handwritten text into digital form. For most of the case institutions, delivering digital access is about taking small, incremental steps, with staff amplifying digital resources as technology, inspiration and circumstances allow; their work demonstrates how, by adding one or two images or a few more details in the catalogue, they enable researchers to form a clearer idea of what records look like and the content they contain. While the advanced technologies used in NHM's specimen digitisation are currently far beyond the reach of most archive services, experience shows how applications which require expert skills to implement today quickly become accessible for all, and that may be the case with NHM's applications. The participants demonstrated that they do engage with books and archives as artefacts and it was instructive to see the ways in which they are documenting material features using text, still

imaging and film. Overall, what shone through was custodians' determination to promote their collections and enable their audiences to discover, use and enjoy them.

The findings are valuable for addressing what effective digital representation of pattern books and textiles could look like and how it might be undertaken. They show that the digital sphere can be used to provide fast access to precise, potentially detailed information about pattern books, their textual contents and textiles, as well as exploratory, material-rich investigations of artefacts and data, and that the two approaches are not mutually exclusive. As participants explained, images excel at conveying design and appearance, while description effectively communicates size, weight and texture and facilitates search, so effective digital access for pattern books and textiles will likely combine text and images. The question of technical terminology needs to be addressed, as it impacts discovery, use and data sharing. Precise descriptors provide clarity about function and content and facilitate access for knowledgeable users, and archivists routinely apply them to other business records, such as profit and loss accounts or day books, for those reasons. But technical language can also impede access. While each institution will have to decide what the requirements of its priority audiences are, the cases, and findings in chapter 1, demonstrate that pattern books attract audiences with diverse research interests. An inclusive approach which combines precision and accessibility could exploit digital's affordances and offer options for browsing visually or by subject as well as precise searching. Consensus within the sector concerning terminology will be important for cross-institutional data sharing. For most repositories, achieving any of this will clearly be challenging and collaborative approaches such as crowdsourcing, placements, knowledge-sharing and partnerships with experts will be crucial. Overall, the learning from these cases has informed the project's framework for digital access to textile heritage collections, ensuring recommendations are pertinent and attainable across the archive sector.

Secrecy was the default attitude in the competitive textile industry. Firms wrote down as little as possible to prevent information leaks, while endeavouring to find out what their rivals were doing. Textile printing seems to have been the exception, with records suggesting that colourists willingly swapped recipes. This 1830s dye recipe book from Milton printworks contains several recipes from other firms. A contact at nearby Dalmonach printworks shared their method for making a spirit pink colour, 'the best done there'. Steam purple recipes came from Darnley printworks, Barrhead, and Brown & Powell in Lancashire, while a 'good deep red' for chintzes was passed on from Balls Bridge printworks, Dublin.

Figure 35. Recipe for printing a steam purple pattern, by Brown & Powell, Spring Vale, Lancashire, 1836 (NLS MS.17982)

Chapter 6 Digital access to pattern books

Pattern books and their textiles embed valuable physical evidence about their creation and functions, which assists users to interpret the records' contexts and content and understand historic manufacturing processes. Digitisation and digital tools can facilitate and enrich the use of these records and analysis of this physical evidence. For archivists, the question is how to embrace digital's affordances to make records and textiles visible, discoverable and usable, and enable audiences to explore and engage with them creatively and analytically, especially when time, textile expertise and access to technology may be limited. This chapter examines questions related to the provision of digital access for pattern books, starting with audiences and access routes, before considering sustainability, invisibility and transparency, and knowledge sharing. It incorporates findings from the project's exploratory survey of textile heritage users' experiences of accessing pattern books, and those from the institutional case studies and two case studies of digital access initiatives at Chatsworth Archives and the Glasgow School of Art (GSA). Findings from the Chatsworth and GSA cases are discussed throughout the chapter; a full case report on GSA's work to tailor collections access to the needs of its core audience of creative practitioners is also presented as an example of how material-centred access can be implemented.

As touched on throughout the thesis, the Covid-19 pandemic brought the issue of digital access to the fore for GLAM sector organisations. The enforced closure of cultural heritage services in March 2020 cut staff and users off from physical collections and sites and obliged organisations to pivot rapidly to digital tools and services, if they could. GLAM staff responded creatively and wholeheartedly to maintain access to collections and assist researchers. They embraced the affordances of social media to reach out to existing and new audiences, informing and entertaining people hungry for cultural sustenance in difficult times and supporting home learning. Those who were able repurposed existing digital resources, such as site tours. Those without showed what could be achieved with little more than a smartphone. Video conferencing and streaming tools were adopted rapidly. Online tours, activities and resources showcasing collections abounded and received far larger, and more geographically dispersed, audiences than onsite activities ever had.[141] Some archives and libraries used live streaming technologies to offer virtual teaching, searchroom appointments and researcher enquiry services (Greenhall, 2021;

[141] For example, NLS' online events in 2020-2021 collectively reached 9,023 people in seventy countries, up 57% on 2019-2020 attendances (National Library of Scotland, 2021).

National Library of Scotland, 2021). Staff had time to catalogue unprocessed collections, retro-convert analogue catalogues and enhance and publish digital metadata and content. But the lockdowns also highlighted the digital divide within the GLAM sector. In a number of institutions, staff ingenuity and determination could not overcome the reality that staff had minimal or no digital access to collections data, never mind their audiences. For example, with no online catalogue or remote staff access to the organisation's server, Sunny Bank Mills Archive's curator found that she, her volunteers and publics had no access to collections (Moaby, 2022). The Collections Trust discovered that staff and volunteers in nearly 40% of UK museums were unable to access collections information remotely (Simpson, 2020). Covid has brought lasting change to GLAM institutions, for example, digital output has increased in quality (One Further, 2022) and remote researcher appointments and online learning sessions are now part of the standard offer in some institutions (Ashworth and McCrystal, 2021; Knott, 2021). But, audience expectations have grown. Having become accustomed to using digital services, they now assume that digital collections data and digitised records will be available to view and download (Senior Assistant Librarian, 2021). Although GLAM staff want to sustain their new digital activities and online communities, delivering digital work alongside onsite reader and collections management services tests staff capacity.

Audiences

Given that digitisation and the development of online catalogues are usually undertaken to facilitate user access, institutions considering digital access initiatives for textile collections need to evaluate who their core audiences are, and what their requirements might be, ideally by asking them (Anderson, 2006; Prescott and Hughes, 2018). These audiences may be subject experts or curious enquirers. Some may be technically proficient and have access to a plethora of digital applications; others will have limited digital skills or tools. Some will approach the catalogue and digitised resources with specific research questions. Others want to browse with no destination in mind, to encounter the collections for creative inspiration or pleasure (Digital Transition Manager, 2022). For example, scholars are a longstanding core audience for NLS, but the Library also desires to be a destination for onsite and online audiences pursuing lifelong learning or individual research projects, seeking inspiration or looking for entertainment (National Library of Scotland, 2020b). Meeting the requirements of each community and the diverse people within them will be challenging. As discussed in chapter 5, it is easier to address the needs of a clearly delineated audience. The Natural History Museum (NHM)'s priority audience

for its specimen metadata is scientists, who want structured data in industry formats for mass aggregation and data crunching. Consequently, the NHM has configured its data portal's functionality and data formats to meet their requirements. Similarly, GSA's catalogue and website are designed to allow its students and staff to browse its collections visually or by subject and see what inspires their creativity.

Limited research has been published into the audiences for textile heritage collections and their requirements for online discovery and access. To address that gap, this research project undertook a small-scale, online survey between March and May 2022. The survey sought to gain insights into what researchers use these collections for and gather views on how they discover and digitally access them. A full discussion of how the survey was designed and implemented is given in the Methodology chapter; the questions and responses received are presented in Appendix One. Thirty-five people completed the questionnaire; participants were self-selecting, their responses were anonymous and no personal data (e.g. name, role) was collected. Given the small dataset and use of non-probability, non-randomised sampling, no attempt has been made to extrapolate generalisations about textile heritage researchers' requirements (Williamson, 2013a, pp. 340–341); the data is presented merely as a snapshot of views. First, participants were asked to identify the topics they research, as this shapes how they interact with the collections. The topics offered were derived from the literature, feedback from reviewers during the design phase and the author's interest in the use of records for creative and commercial purposes. Participants could tick all that applied and most participants chose several options, in a variety of combinations. Table 6 shows the total number of responses for each topic. Additional topics named by participants in a free-text box included the reconstruction of historic dress as a research methodology; histories and technologies of books and bookbinding; military uniforms; handsewn quilts; garments for performance; techniques for making textiles; and iconography.

Table 6. Topics survey participants research through textile heritage records

Even this small sample showed that researchers access textile heritage collections to study a wide variety of topics. Archivists may therefore need to consider this if they are planning a programme to improve access to pattern books through cataloguing or digitisation, unless the service is targeting a specific core audience with defined requirements, as the GSA has done.

Publishing data online

Publication routes

As the participants in the institutional case studies made clear, the methods available to an institution to publish catalogue descriptions and/or digitised records online depend on factors such as financial and staff resources, level of access to IT skills and support, and organisational structures. An in-house collections management system (CMS) with integrated public viewer is probably many archivists' preferred model, as there is one set of data to maintain, they have control over how the data is managed and presented, and digitised records, if present, are linked to their respective catalogue records. Researchers viewing an entry in the NHM Library and Archives' online catalogue will find the digitised version of the document (if available) embedded. If they encounter the item via the digital gallery instead, this route also leads them to the catalogue record. This is more satisfactory than NLS' digital gallery and online catalogue, which are not connected, leaving catalogue users unaware that records whose description they are reading have been digitised (as explained in the NLS case study in chapter 5, this is being addressed with new software).

Archive departments within a larger heritage organisation may have access to a CMS, but find themselves struggling with a system configured to library or museum standards and thus designed around requirements for communicating information about books and artefacts. As discussed in the previous chapter, ASC decided to use museum collections software EMu, because The Hunterian, the University of Glasgow's museum and art gallery, as already using it. Another archive user of EMu is Chatsworth Archives, because the Chatsworth estate required a CMS which could handle books and works of art, as well as archives. Both ASC and Chatsworth found that EMu required extensive customisation to make it suitable for cataloguing archives (Assistant Archivist, 2022; Head of Archive & Library, 2023). Even if archivists can choose which CMS to purchase, the high purchase price and annual fees for proprietary systems limit who can afford them. Open-source tools have lower or no upfront fees, but the IT skills required to configure and manage them may need to be procured, as GSA had to do with AtoM.

For services without access to an in-house online catalogue, publishing collection records via an archival aggregator is a useful alternative. It is also an effective way to raise the profile of a small service, whose existence may not be known to the wider research community, or flag up holdings of records in unanticipated locations. The latter is particularly relevant for pattern books, which are held, amongst others, by archives, museums, art schools, businesses and bodies like the Society of Dyers and Colourists, sometimes far from their original geographic location. There is no charge to contribute data to Archives Hub or TNA's Discovery and these two sites accept data in Excel spreadsheets. Digital images can be linked to catalogue records in Archives Hub, but the process is awkward and the viewer is rudimentary, so few services use it (Crabstick, 2022); Jisc is in the process of developing an improved, IIIF-compliant viewer. Discovery only publishes catalogue metadata. Chatsworth Archives publishes its catalogues on Archives Hub and Discovery. The archivist prefers Archives Hub's search functionality and navigation of collection hierarchies, and its ability to publish more data fields that Discovery offers, allowing more detailed descriptions to be made available. But she feels that it is also important for collections to be visible to audiences using Discovery (Head of Archive & Library, 2023). Services with digitised images to publish may consider Europeana, especially those holding textile collections, as the site features industrial heritage, including pattern books.

Publishing digital versions of records online with sufficient metadata to make them discoverable and usable can be tricky. As ASC staff described, the department built up an

extensive body of digitised records over twenty years but, until it acquired EMu, its publication options were limited to the University Library website and Flickr. Chatsworth Archives has an ongoing digitisation programme, but currently has no publication route. It may not be feasible, or desirable, to digitise a whole document, or if achieved, publish the full image set, but sharing even just one, carefully chosen, image allows users to assess the record's layout and type of content, information by which they can judge its potential usefulness but which may not be recorded in the catalogue. An image also draws users' attention to relevant records which they might overlook in a text-only catalogue (Anderson, 2004; Campagnolo, 2020, p. 71; Senior Assistant Librarian, 2021). Images of pages within ASC's incunabula provide viewers with a flavour of the books' style of printing, decoration and annotations.[142] Page views can also enhance access to design records and pattern books. Researchers unfamiliar with dye recipe books can see the kind of information they contain. Expert users can clarify whether a record catalogued as a pattern book is a designer's sample book or factory floor tool, assess the type of cloth, dyes and manufacturing techniques represented in the samples, and see designs. Survey participants suggested that making images of pattern books available was one way of addressing archivists' lack of expert knowledge, as they allow users to form their own judgements. It is far easier to present an image of a design than describe it. The ASC project team cataloguing Stoddard-Templeton's carpet drawings meticulously described each design, but found it tricky to communicate the interplay of colour and shape in a meaningful way. Had they had a digital camera, publishing photographs of the designs would have been a more effective way to document and communicate the data (Assistant Archivist, 2022). If just one image can be published, it is preferable to make it informationally useful, like the right-hand image in Figure 36. Putting up an image of a volume's blank cover is a wasted opportunity.[143]

[142] In most cases, the Library published three or four images of each book. Where UofG holds the only known copy of an incunabula, the copy was digitised in full and the full set of images was published on Flickr.

[143] For example, the catalogue record for a dye recipe book assembled by one James Scofield in 1848 and held by the Science Museum Group (Ref: 1972-207) is accompanied by a photograph of the volume's front cover, covered in marbled paper and devoid of lettering, https://collection.sciencemuseumgroup.org.uk/objects/co9179/ms-dye-book-with-examples-of-james-schofields-dyi-dye-recipe-book (accessed 19 Aug 2024). Tantalisingly, the description says the volume includes samples of Scofield's work, but offers no details. A photograph of a page bearing a recipe and sample would provide a glimpse of the ingredients, processes used and type of cloth. The V&A also publishes images of pattern book covers in its catalogue.

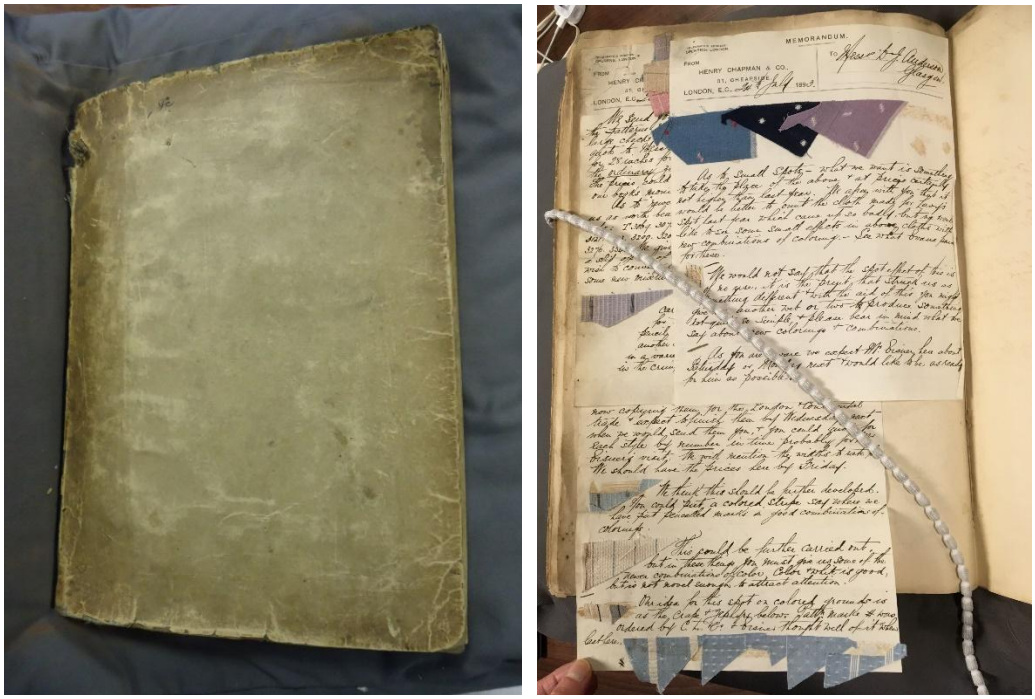


Figure 36. Front cover and inside page, David & John Anderson Limited's correspondence with their agent, 1892-1910 (ASC UGD022/8/1/1)

Search and discovery

Whatever route an archive chooses to place catalogue descriptions and/or digitised records in the public domain, the platform's functionality impacts how effectively researchers can discover, navigate and use the published data. The fields available to search and filter records and options to browse results or navigate by subject, person or place will enhance or hinder researchers' discovery process. The more records there are on the platform, the more nuanced the discovery mechanisms need to be, if users are not to be swamped with results. Poorly contextualised series and item records leave searchers unsure where the record came from and what it relates to (Jones, 2018). Search options, indexing or data configurations designed for one audience's requirements may make resources difficult or impossible for other audiences to use: the commercial platforms through which several archive services make digitised genealogical records available are a case in point. There, access is wholly person and address orientated, yet parish registers and rate books contain valuable data about localities and national and local events, and are accessed by a range of research communities. For example, clergy used the pages of parish registers to record observations about the weather, which are analysed today by historians and scientists to track the environmental impact of historic volcanic eruptions on communities near and far, or to analyse patterns of flooding in one locality over time. But in genealogy portals, weather data is invisible and inaccessible (Veale, Bowen and Endfield, 2017). Textile

company records also contain information about local events, especially weather-related ones, given the importance of water supply, rainfall and humidity in manufacturing operations. For example, notes jotted on a spare page in a Milton printworks' dye recipe book record that the works' dams overflowed on 15 May 1843 and again on 1 June 1862 (ASC DC90/7/3/1). A detailed weather diary for Catrine bleaching works includes references to the return of (named) local men from military service in South Africa in 1901, the River Ayr in spate and an explosion at the Nobel Explosives Factory, Ardeer (ASC UGD091/1/5/2/8/3). Discovery decisions should not make information like this unfindable.

Visual-based discovery tools for textiles free researchers from text-based searching but their functionality may, like the genealogical platforms, limit their usefulness if multiple use cases are not accommodated. The Liberty Archive and University of Dundee collaborated to develop an intuitive image browser for Liberty's in-house textile designers, who want to browse serendipitously through numerous images of textile samples for inspiration. Seeking to replicate the designers' physical practices, the interface presented a large number of samples in one view and allowed users to group, reorder and magnify the samples. This interesting tool was also tested on V&A images, to explore its usefulness beyond Liberty's commercial requirements, but it does not appear to be publicly available (Ward *et al.*, 2008; Eastop, 2012). The Ausberg Museum's Calico portal (discussed in chapter 4) allows users to visually browse calico samples by colour, motif or at random. For those seeking visual, creative inspiration from textiles, it showcases the fabrics and allows untrammelled exploration. But researchers who want to study the samples in context cannot systematically browse through a pattern book, compare one sample with its neighbour or find all samples from one volume. Any textual data in the pattern books relating to the production or function of the samples is not accessible.[144] Without context, the samples are pretty pieces of fabric whose role and significance in terms of their manufacturer's overall output are lost. Similarly, the cream wool sample shown in Figure 37 would say little as an isolated image. Viewed in context as part of a 1932 advertisement for men's woollen underwear, its role in enhancing marketing and the social history it embeds about dress, weather, efficacy of domestic heating and customer requirements becomes clear.

[144] The museum has recently published complete digital copies of sixty-three Neue Augsburger Kattunfabrik pattern books on www.bavarikon.de (accessed 8 July 2024). This is signposted on the Ausberg Museum website but not within the Calico portal.

Figure 37. Advertisement for men's Scotch wool underwear, 1932 (ASC FRAS/145/1/19)

Text-based discovery depends on what text is included in catalogue descriptions. UofG Library holds some seventeenth-century books with embroidered bindings but not all their catalogue entries mention the binding's existence.[145] If no date has been specified, researchers cannot screen potential sources by date. The Milton collection at NLS contains twenty-six dye recipe books, sixteen of which contain fabric samples, but the catalogue does not distinguish which they are, obliging textile researchers searching samples to order all the volumes. ASC's House of Fraser catalogue signposts the presence of samples in some advertising leaflets and product catalogues, but not all. Researcher Katie McClure is studying Caledon dyes, which were synthetic, fade-resistant, textile dyes produced originally by Scottish Dyes Ltd. and subsequently by ICI. ICI issued marketing catalogues containing fabric swatches to promote their colour ranges and these catalogues are valuable resources for McClure's research, because they have a clear provenance, definitely include Caledon dyes and are datable. But she finds that GLAM catalogues lack the details she needs to identify ICI's catalogues and evaluate their potential relevance, such as date of

[145] UofG reference Sp Coll Euing Dp-i.2 represents a Bible, Book of Psalms and New Testament bound together, which implies they share a binding. Each text has its own catalogue record, but only the Bible's mentions the binding.

publication (she knows when dyes of interest were brought to market), textile type (the dyes were mainly used on cotton and rayon), colour spectrum (blues and greens were bestsellers) and the presence of samples. Consistent, familiar, terminology helps, for example, 'ICI' rather than 'Imperial Chemical Industries'. An image of samples on an inside page is more useful than one of the front cover (McClure, 2022).

Museums, or archives, using object-based museum collection management systems may face challenges when publishing pattern book collections online, because these systems are not designed to model archival collection relationships (Jones, 2018). NMS has custody of over two hundred pattern books donated by the United Turkey Red Co. Ltd. and its predecessor firms. The pattern books are listed in the museum catalogue; for some volumes, images of selected pages are also included. But each page is catalogued as a independent entity and is not linked to its parent volume or sibling pages. Take an 1874 home order book belonging to John Orr Ewing & Co. (NMS A.1962.1266.76.6). A search on the exact reference retrieves the catalogue record for the order book, which informs the viewer that no images are available. Add an asterisk to the reference or search on 'home order book Ewing' and images of four pages surface as well. A search on 'John Orr Ewing' retrieves 384 results, with no option to sort them by reference number, date or title. The object reference number is not visible in the search results overview. As Jones observed, individual page records are intermingled with volume entries, in no apparent order. With just sixteen items displayed per screen, the researcher will require considerable time and patience to methodically review the results and reconcile volumes and pages.[146]

The project survey asked participants about the methods they use to locate textile heritage collections (see Table 7). Most search GLAM online catalogues and follow up references in books, articles and conference papers, while just under half browse curated online collections to see what is available. Paper-based collection resources (printed guides and reading room catalogues and indexes) still have a role in discovery. Participants also reach out directly to institutions known to hold relevant collections.

[146] In Spring 2023, NMS undertook research into how users search the catalogue, in advance of implementing a new digital asset management system, so improvements may be planned.

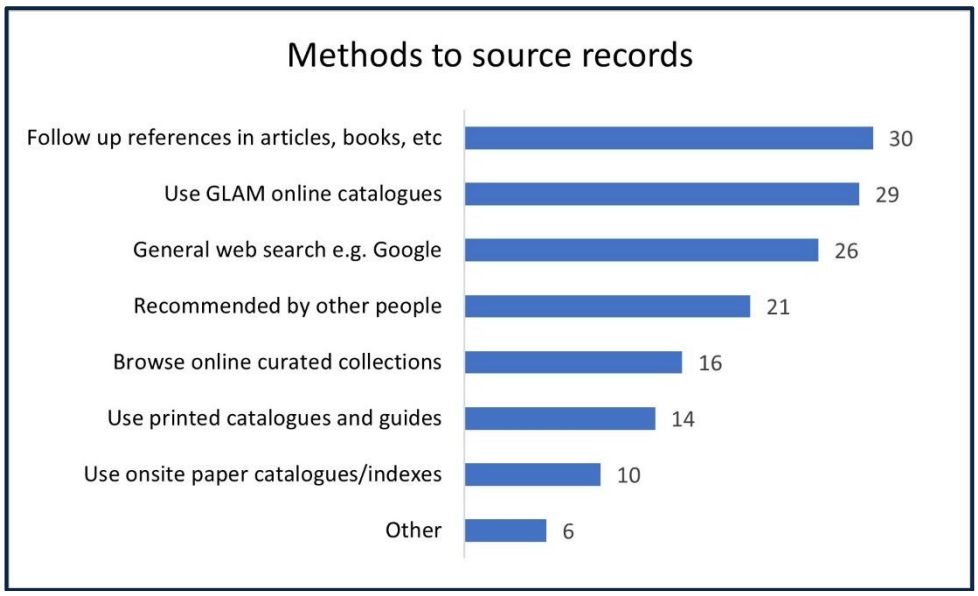


Table 7. Methods survey participants use to find textile heritage archives

Anderson found that academic historians prefer to follow up published references and colleagues' recommendations because they are assured that this information is accurate and can ascertain its relevance. They employ browsing and serendipity to find records which are poorly catalogued or unused by other researchers (Anderson, 2004). While other researchers' references are undoubtably helpful, there is the risk that the research community focuses on a subset of oft-cited material and overlooks the wealth of valuable, but lesser-known, records available (Warwick *et al.*, 2008, p. 98; Senior Assistant Librarian, 2021). Institutional or sector guides provide broad overviews of holdings, but may exclude uncatalogued material and, in the case of printed guides, cannot be updated so become out of date. The Royal Commission on Historical Manuscripts (HMC)'s guide to holdings of textile company archives in Britain and Northern Ireland is a useful tool,[147] but although HMC staff did survey uncatalogued collections so they could include them, many pattern books held by GLAM institutions in the North-West of England were omitted because they were unlisted (Sykas, 2001). Despite their limitations, printed guides can be accessed outwith the repository, extending their reach. Southwark Archives is acutely conscious that information in its paper catalogues is only accessible onsite: creating an online catalogue is a top priority for staff (Southwark staff member, 2022).

[147] Royal Commission on Historical Manuscripts (1990) *Records of British business and industry, 1760-1914. Textiles and leather.* London: HMSO. 205 entries in the guide resulted from HMC surveys (1990, p. ix).

Catalogues are indispensable access tools, but frequently baffle users (Yeo, 2017, p. 100): survey participants found searching online catalogues a complicated business. One participant observed, 'Online resources are really useful to me. However, these are not easy to find or search!'. Poor search functionality impedes discovery and another participant remarked, 'It's incredible how many online databases from museums do not include the date as a search parameter or filter.'. Inconsistent or imprecise terminology for pattern books and textiles leaves participants unsure how to proceed. One commented, 'Knowing what is possible and sensible to search for would be helpful!', and another, 'Knowing what terminology to search for and where to look. The standard of cataloguing and level of material accessible online is inconsistent (for understandable reasons).'. This suggests researchers end up trying all possible variants to see what the catalogue yields. 'Nothing found' might mean that the repository does not hold any sample books, or equally, that it does, but they have not been catalogued as such, and researchers are left uncertain which is correct. Some catalogues do address this. Running a search on 'pattern book' in the V&A's catalogue, the researcher can narrow down the results by selecting 'sample book', 'swatch book' or 'dye book' under the Object Type filter. Survey participants were invited to select one measure (from a defined list) which they felt would improve their ability to locate relevant textiles in catalogues. The preferred options were naming textile types e.g. rayon, and using subject tags to filter searches (Table 8). No-one chose standard colour descriptors, like Pantone.[148]

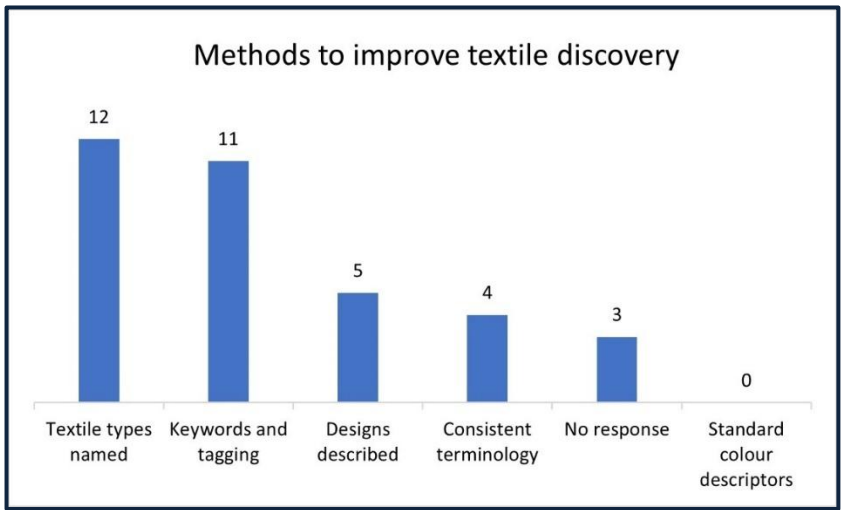


Table 8. Survey participants' preferences to improve discovery of textiles in catalogues

[148] The options offered were approaches which had been trialled by ASC or discussed in the literature. No 'other' option was offered for this question for technical reasons; in retrospect, it would have been useful to see what other methods participants suggested.

The survey participants are sympathetic to the circumstances in which cataloguing is conducted. They recognise that few archivists or curators are textile specialists and that resources are limited. 'The archivist doesn't necessarily know the details regarding the textiles, especially within sample books', one wrote. Another reflected:

> Many absolutely stellar items just aren't prominent or available online. Sometimes it's because the museum has never had the resources to employ someone who knows the significance of what they're looking at. Sometimes it's because there haven't been the resources or knowledge available to put them online in a way that makes them easy to find.

Overall, it is clear that participants find the search process complicated. It is unsurprising that one felt that direct contact with curators or emailing Subject Specialist Networks like the Dress and Textile Specialist Network[149] are the most effective ways to discover what repositories hold.

Transparency, sustainability and invisibility

As the survey participants made clear, inconsistent terminology and unwieldy discovery tools leave researchers uncertain whether they have surfaced all relevant records present on an online platform. Meanwhile, a lack of signposting about collection coverage on a platform means researchers do not realise that the descriptions and images they do find may only represent part of the repository's holdings for that collection or topic. Records with no digital footprint are largely invisible. Consequently, institutions invest considerable resources in digitisation to improve access and visibility, yet digital outputs can be structurally fragile and lack a long-term maintenance plan. Concerns about digital transparency, sustainability and invisibility have been recognised for a long time. Back in 2002, Resource[150] commissioned a report on online access and digitisation. The report concluded that cataloguing is fundamental to online access; thematic projects skew what records get digitised; digitised material needs to be presented in context and with adequate metadata; resources created through short-term funding lack sustainability; and that

[149] Subject Specialist Networks are independent organisations which enable custodians caring for the museum collections they represent to share information and access training. There are about forty-five in the UK; collections represented include coins, Islamic art and textiles (Stephens, 2016).

[150] Resource: The Council for Museums, Archives and Libraries was a non-departmental public body which supported sector development and advised government policy (The National Archives UK, 2017).

audiences assume that what is online is the entirety of records for a collection or topic and overlook the wealth of material with no digital footprint (Rudyard, 2002). A contemporary report by Diane Zorich (2003) into the sustainability of digital cultural heritage outputs identified that funding was readily available to create new outputs but not for ongoing maintenance. She found that organisations did not budget adequately for maintenance, or plan how core staff would support outputs once the project team disbanded. Projects designed to meet funding criteria did not necessarily align with the heritage organisation's long-term strategic priorities. In the twenty years since these reports, digitisation of cultural heritage has grown apace, but the sector continues to grapple with sustainability, collection invisibility and communicating transparently with audiences about what has, and has not, been digitised, and why.

As Rudyard pointed out, the records which get digitised are not necessarily representative of the institution's holdings or more informationally or evidentially significant than records left undigitised. Many audiences are unaware of the factors influencing digitisation decisions and especially how external funding, a significant driver, skews selection. Externally-funded thematic projects often involve digitising single items extracted from a number of collections (Lindsay, 2003), but may cover whole series or, more rarely, complete collections. For example, as described in chapter 5, joint University of Glasgow/Wellcome Foundation projects digitised three entire collections of geneticists' papers, but only selected series of mental healthcare records. Chatsworth Archives has secured funding from the American Institute of Physics to catalogue the scientific papers of Henry Cavendish (1731-1810) at item-level and will publish the data on Archives Hub. However, Cavendish's badly-muddled estate papers will only be box-listed and the list reserved for internal use, leaving those papers hidden from public view (Head of Archive and Library, 2023).[151] Drivers for internally-led digitisation also impact coverage. The NLS' mass digitisation programme focuses on out-of-copyright and Crown copyright printed books, pamphlets and maps which fulfil institutional priorities and which can also be efficiently processed. ASC prioritises archives, books and manuscripts which are in demand for teaching, but has also built up a bank of images by retaining copies of customer requests. NHM Library and Archives selects records for crowdsourced transcription by evaluating their structure, legibility, terminology and potential audience engagement (Cardy and Pollard, 2023). All these methods are valid routes for increasing

[151] For information on Henry Cavendish's scientific work see www.chatsworth.org/news-media/news-blogs-press-releases/henry-cavendish-the-man-who-weighed-the-world (accessed 25 Sep 2024).

digital access, but the uneven collection coverage which results means there needs to be a way to explain to audiences what is, and is not, available digitally.

Whatever digital resources are created, the resilience, security and environmental impact of these resources and the systems through which they are accessed need to be addressed. Digital sustainability is a significant issue in the Humanities and cultural heritage sectors (and elsewhere). Throughout this project, the author has followed up citations for websites, articles and online resources, only to find that they are not at the web address cited, survive as minimally-functioning placeholders or have disappeared. Digital outputs of short-term, externally funded projects are most likely to wither once the project, and the money, have ceased, because technical longevity was not factored into the resources' design and no money is available to upgrade them or renew hosting contracts to keep them online (Robey, 2011). One major digital resource which was presumably intended from the outset to have a long life, but which seems to have lacked a sustainable forward plan is the Scottish Archive Network (SCAN). The SCAN catalogue portal for Scottish archives was a great achievement when it launched in 2004, but a lack of ongoing development has seen it stagnate since. It was one of four large-scale UK archive catalogue portals launched in the early 2000s, following research by the National Council on Archives into online access to UK archives; the others were Archives Hub, AIM25 and A2A (Flynn, Hillyard and Stockting, 2001). Funded principally by the Heritage Lottery Fund, SCAN's project phase ran from 1999-2004, during which it collated and published collection-level descriptions for over 20,000 collections held in fifty-two Scottish archives. When the project phase concluded, NRS took over responsibility for the portal. SCAN's board anticipated that a follow-up project would add item-level records, but it did not happen (Mildren, 2004; *About Us*, 2004). NRS has kept SCAN functioning, but the website and collections data have not been updated.[152] A2A, Archives Hub (part of Jisc) and AIM25 (funded originally by the Research Support Libraries Programme) have received sustained support since they were launched and contributor data has been updated, keeping these sites relevant twenty years on; it is unfortunate that the same outcomes were not secured for SCAN.

Despite warnings from SCAN and other projects, and reports like Zorich's and Robey's, poor digital resilience persists. A discussion on the Museum Computer Group email forum

[152] The Scottish Council on Archives has developed Your Scottish Archives, a new online portal for Scottish archive catalogues, which was launched in December 2024, https://yourscottisharchives.com (accessed 12 Feb 2025). It is intended to replace SCAN.

in April 2024 about the legacy of the approximately eight thousand First World War centenary projects concluded that thirty-eight of the 148 online database projects have already disappeared or been moved from their advertised URL without redirection (Morley, 2024). Ways to address the technical resilience of digital cultural heritage resources have been proposed. Robey (2011) suggested that unsustainable platforms should be abandoned at end of life and the data transferred to an alternative channel to keep it publicly accessible, even if functionality is lost. Da Rold (2021) recommends that designs for digital catalogues prioritise structurally straightforward, transferable solutions which do not depend on proprietary software and formats, as these are more likely to be durable and updatable. *Persistent Identifiers (PIDs) as IRO Infrastructure*, a Towards a National Collection project, investigated ways to implement persistent identifiers for GLAM collection objects and records, to support discovery and use and address problems with URLs (The British Library *et al.*, 2020). Actions like these can improve technical durability, but only if organisations follow Zorich's recommendations and plan at the outset how they will sustain project-generated resources long-term through core budgets and existing staff.

Technical obsolescence is allied to the increasingly urgent issue of digital security, as the British Library found to its cost in October 2023, when a catastrophic cyber attack severely damaged and, in some areas, destroyed the Library's digital infrastructure. This attack warned the cultural heritage sector that it is a target and demonstrated how severe the consequences can be. The British Library was forced to completely rebuild its digital infrastructure and, eleven months after the attack, is only starting to restore partial, modified, access to services such as remote ordering, digitised manuscripts and online learning resources (Keating, 2024). The Library acknowledged that its legacy applications and the way its network was configured to accommodate them had allowed the attackers to do more damage than would have been possible in a system fully compliant with modern security standards; they also hampered the restoration of services, as these older applications would not run on the new infrastructure, or were no longer vendor-supported. Funding had been a contributory factor, as some planned system upgrades had been postponed (British Library, 2024).[153] The Library's large number of specialist resources has complicated service reinstatement and it may not be viable to offer them all in the future (Prescott, 2024). Given that even the newest infrastructure and applications have

[153] The British Library reported that its security measures did successfully protect a number of assets, including critical areas such as finance, payroll and building management.

vulnerabilities, all archive services will have to critically evaluate what mitigations are in place to protect, and if necessary, rebuild, their data and systems. The use of freeware, open-source tools and workarounds to get data online will have to be risk-assessed. Similarly, curating collections data to provide tailored services, as the NLS has done for its digital gallery and the British Library did for its digital manuscripts, and custodians may wish to do for textile heritage collections, may prove to be unsustainable for systems management.

Environmental sustainability within the cultural heritage sector is a complex area which is the subject of ongoing, wide-ranging research and there is not space here to set out all the factors, so this section signposts to current actions in the archive sector and highlights a few issues associated with access to pattern books. The cultural heritage sector is mindful of the environmental impact of its activities, including its use of air-conditioning systems and the energy consumption which underpins the creation, transmission and storage of digital data, and is seeking to reduce that impact. The ARA's 2024 conference addressed climate advocacy and education and topics included passive and sustainable storage, and digital recordkeeping and the cloud. The ARA has established an Environmental Sustainability Group, which researches questions associated with archive administration, provides tools and resources, and advocates for environmental sustainability within the sector.[154] For archivists weighing up environmental concerns associated with digital access to pattern books, they might consider the environmental cost of storing records which are not used because they are invisible or hard to discover, and conversely, the benefit of providing good enough metadata online which reduces unnecessary researcher visits to the archive. Judicious choices over which records are digitised, where digital data is stored, how many copies are made and which file formats are used can also reduce the digital footprint of digital access.

The invisibility of records which have no digital footprint is another significant challenge for archives. Researchers with limited experience of using archives assume that what has been digitised or listed in an online catalogue represents the entirety of the institution's holdings. Even those who realise that institutions' holdings are more extensive may be tempted to use what they can access online, rather than seek out records only available onsite (Prescott, 2014; Paul, 2020; Assistant Senior Librarian, 2021). Items which are not

[154] See https://www.archives.org.uk/environment (accessed 15 Sep 2024). The Museums Association and CILIP also have member groups supporting and advocating for environmental sustainability.

used because they are hard to discover risk being perceived as not worth keeping, especially to those who manage budgets (Jeurgens, 2013). Digitisation can be one way to surface invisible collections and awaken latent demand (Anderson, 2006). 'Improving visibility' is one of NLS' digitisation selection criteria and curators are encouraged to propose collections which are underused because they are difficult to find through the catalogue (National Library of Scotland, 2018; Digital Transition Manager, 2022). Creating a basic catalogue record for each collection is a useful first step to reduce invisibility (Jeurgens, 2013). The difference an online catalogue record can make to collection use was exemplified by the Access to Archives project (A2A). A2A has been described as a 'game changer' for archive services, because it made structured digital catalogue data publicly available and transformed the way users accessed services and collections (Doherty, 2023). Over four hundred services, large and small, public and private, contributed ten million records to the A2A portal (Malik, 2008). The searchable catalogues led to users, and archives staff, encountering and using records which previously they had been unaware existed. Descriptive information does not have to be in an online catalogue to be useful. ASC has published downloadable guides for topics covered by its business collections, including brewing, banking, textile manufacturing and shipbuilding, while Ayrshire Archives is making pdf copies of selected catalogues available on its website.[155]

Most services appreciate that digitisation and cataloguing can improve collection and institutional visibility. But many small or poorly-resourced archives lack the means to put material online. Paul (2020) cites private libraries and cathedrals as instances of institutions curating significant collections of medieval manuscripts but lacking resources to make them visible online.[156] Organisations holding textile heritage records find themselves in a similar situation. For example, Southwark Archives has no online catalogue and its website does not accommodate images of collections, so the only public listing of its UNESCO-inscribed Crutchley Archive is a brief and easily missed collection record on TNA's Discovery catalogue. Back in 2005, Forde (2005) pointed out the huge gap between archive services which had the resources to embrace cataloguing software, online catalogues and new funding streams for digitisation and learning activities, and those whose limited resources prevented them from even putting together funding

[155] See www.ayrshirearchives.org.uk/article/46894/Catalogues and www.gla.ac.uk/myglasgow/archivespecialcollections/discover/universitybusinessarchivessubjectguides/#d.en.60649 (accessed 19 Aug 2024).

[156] Small services may also hold back from showcasing their collections, because they have to be circumspect in creating demand which they cannot fulfil.

applications to try and get on board. She proposed that flourishing services partner with those needing support and share their expertise. The pandemic made clear that the digital divide which Forde identified persists and it was evident in this project's case studies. The issue was addressed by NHM participant Vincent Smith, who explained why the museum is putting in place the type of partnership working Forde proposed and how it will assist regional museums to digitise their local natural science collections (Smith, 2022). Paul, too, has suggested that larger and smaller institutions could work collaboratively on digitising medieval manuscripts (2020). Given the challenges of putting complex sources like pattern books into the public domain, sharing and maximising resources, knowledge and expertise about collections and digital technologies across the sector makes sense, but is not always straightforward in practice.

Knowledge sharing

Knowledge, data and resources about textile heritage collections or individual items exist in many places, but are often siloed. Within an archive or museum, information concerning a pattern book may be compiled by the conservator who repaired it, the archivist or volunteer who catalogued it and learning officer or intern who researched it for engagement activities. External researchers might study the company's history, experiment with recreating dye recipes or scientifically analyse samples to identify the fibres. Staff and contracted partners may work together to produce exhibition materials, learning resources, podcasts or blogposts. Collectively, this body of knowledge elucidates the pattern book's function, the processes which produced the textiles and the business which directed that manufacture. Making it accessible to all would assist staff to preserve and interpret collections more effectively, enable researchers to build on existing research, rather than repeat it, and showcase the rich data these textile collections embed about manufacturing, science, technology and society. But all too often, this information is dispersed and disconnected and joining it up can be difficult.

Institutional data

Even within one institution, information about collections can sit in unconnected systems. Conservators' treatment records and photographs are isolated within their documentation system. Evidence collated by collections staff to support cataloguing or engagement resides within their filing system. Staff cannot access all the data the institution holds about any one collection, nor is all publishable data accessible through, or incorporated

into, the catalogue for public viewing (Jones, 2018; Campagnolo, 2020). NLS case participant Carol Campbell explained how useful it would be if NLS collections staff could access the conservators' records (Campbell, 2022). The Bodleian has expressed a desire to publish its conservators' data about decoration and damage on manuscripts but has no definite implementation plan (Stanford, 2018). Users researching material features would welcome access to conservation data. For example, historian Joanna Tucker, who studies scribal activity through material evidence in medieval documents, spoke of how valuable being able to access this data through institutional catalogues would be for her research (Tucker, 2021). Descriptive data in the public domain can also be dispersed. At ASC, the collections information which student interns publish on Flickr is not routinely added or linked to ASC's catalogues. For example, Edwin Hutchison, a Technical Art History student, published detailed descriptions and close-up photographs of the University's seventeenth-century embroidered bookbindings on Flickr, but his records are not linked to the Library catalogue, nor, with one exception, does the Library catalogue contain Hutchinson's descriptions or signpost users to Flickr. ASC staff also used Flickr to publish images and descriptions of textile samples from department store Mawer & Collingham's product catalogues, but the ASC catalogue makes no mention of the samples or Flickr. Consequently, researchers encountering these collections via the University catalogues will be unaware that potentially useful additional textual and visual information exists.[157]

Researcher data

It is not just staff who assemble data and images about collections. Researchers compile notes, analyses, datasets and published outputs and most take dozens of photographs of documents they study in the searchroom. Heritage scientists extract information from manuscripts, books, documents and pattern book textiles about the composition and sources of inks, pigments, dyes, paper and textile fibres (Campagnolo, 2020, pp. 80–81). Project survey participants drew attention to the ecosystem of information relating to textile heritage research, from institutional catalogues and researcher databases to information shared informally among individuals. GLAM staff and researchers recognise that connecting researcher data, containing valuable insights into collections, with institutional catalogues would support the interpretation of where, when and how

[157] Bindings album www.flickr.com/photos/uofglibrary/albums/72157633107049315. The library catalogue record for Sp Coll Euing Dk-i.17 includes Hutchinson's description and a link to the Flickr album, https://eleanor.lib.gla.ac.uk/record=b1699587. Mawer & Collingham album www.flickr.com/photos/uofglibrary/albums/72157664742221773 and catalogue records www.housefraserarchive.ac.uk/series/?id=fras-1005 (accessed 25 June 2024).

documents and artefacts were made and used. But finding a method that is sustainable and acknowledges the researcher's intellectual property is problematic. As examined above, signposting to online resources is unsatisfactory because URLs change, material is moved and websites are taken offline. Research outputs published through academic third parties are more stable, but may not be available to audiences outwith the Higher Education sector. Lecturer Johanna Green (2021) wanted to link her manuscript orientation videos, published on EdShare, to the relevant institutional catalogues, but EdShare is only accessible to UofG staff and students. The academic ecosystem can also hinder data-sharing: heritage scientist Anita Quye feels a responsibility to share data from her analyses of pattern book textiles with their custodians, but is under pressure to secure her intellectual property and publish her research to fulfil academic requirements (Quye, 2021).

Few GLAM institutions appear to have pursued associating researcher data with catalogues, certainly in any systematic way. But some have thought seriously about the benefits of acquiring or linking to researchers' photographs of collections, not just to increase availability of digital content, but because researchers capture details and perspectives omitted by institutional digitisation. In addition, their images, containing shadows and taken from awkward angles as researchers work round searchroom lighting and document supports, can convey a greater sense of the documents as three-dimensional, physical artefacts than carefully lit institutional digitisation (Green, 2018; Wakelin, 2021). Researchers also photograph documents which are unlikely to be prioritised for digitisation by the institution (Paul, 2020). Cultural heritage institutions have explored the feasibility of collecting researcher images. The Bodleian Library ran an image crowdsourcing experiment in 2015 using Flickr, but received few submissions, mainly, Wakelin felt, because scholars were unaccustomed to sharing their work in this way (Wakelin, 2021).[158] In 2016, Museum Studies students at the University of Leicester designed *arHive: the collective archive*, a prototype crowdsourcing app which would enable researchers to upload their document images to a digital library in accordance with archival standards; the images would link directly to the custodian's online site. The students envisaged a space with knowledge-sharing at its core, rather than just an image library (Findlay, 2016; University of Leicester, 2016).[159] Potential concerns regarding user contributions which

[158] See www.flickr.com/groups/bodspecialcollections (accessed 19 Aug 2024).
[159] The student team was a winner in Jisc's Summer of Innovation Student Ideas competition 2016, but their app does not appear to have been developed into a public product.

organisations would have to address include attribution, quality appraisal and capturing adequate metadata (Yeo, 2017; Prescott, 2022).

Networks of data

Jones (2018) recommended that museums and archives connect records, internal data and external resources through a rich network of contextual relationships, based on authority records for persons, places and subjects. For models he drew on ISAAR(CPF) and anthropologist Clifford Geertz's concept of 'thick description', that is, description of artefacts and archives which is full, contextualised and set in its broader cultural context. Some archives, like the GSA, have implemented ISAAR(CPF)-compliant thesauri and authority records to enhance catalogue data and support discovery.[160] *Records in Contexts-Conceptual Model* (RiC), the International Council on Archives' new conceptual model for describing records, agents and activities, takes the idea of contextual relationships further. Building on ISAAR(CPF), ISAD(G) and ISDF (the ICA's standard for describing functions), it conceives of description as a network of entities (persons, activities, etc.), data and records, and reflects twenty-first-century archival theory's conceptualisation of archives as networks of many-to-many relationships. For archivists, once they have familiarised themselves with the model intellectually, the challenge is how to apply it to cataloguing practice and construct rich networks of relationships and data with the tools at their disposal. Current archival software was designed to fulfil sector requirements for representing hierarchical, one-to-one or one-to-many relationships. While tools like Calm and AtoM support the application of authority records, thesauri and keyword tagging, whether they can be modified to accommodate more complex data relationships, or replaced with new tools, will depend on the architecture required, customer demand and developer willingness. Once again, services with limited resources risk being left behind. Subject and name terms can be associated with elements in multiple Excel spreadsheets or MS Access tables, but this could become complicated to manage at scale. Some services do already hold a rich body of linked data, but in analogue format. Glasgow City Archives has an extensive and helpful subject index, linking collections together as Jones recommends, but it exists as drawerfuls of typed index cards annotated with handwritten updates. Converting that index into a digital network would require appropriate software, and staff time, or ideally, the NHM's computer vision metadata processing tool.

[160] Other examples include NLS, Shetland Archives, Kresen Kernow and SCAN.

Back in 2003, Elizabeth Yakel expressed concern that cataloguing software and professional standards risked stifling sector innovation and development, because it would be too expensive to build or modify digital tools to accommodate new theoretical approaches, and standards become embedded in practice (2003). Initiatives in the 2000s sought to address archivists' difficulties in arranging records produced by complex corporate bodies by building function-based descriptive tools. The GASHE (Gateway to the Archives of Scottish Higher Education) project tested the thesis that descriptions of functions could capture the complex, evolving administrative structures implemented by Higher Education institutions to deliver core functions, such as student registration, and that these descriptions could facilitate user access (Richmond, 2002; Peters, 2005).[161] The GASHE evaluation report declared, 'Both academics and archive professionals have already shown a keen interest in this approach to archival description and the project has clearly demonstrated the need to continue with this groundbreaking work' (Richmond, 2002, p. 1). Impressed by the usefulness of this method, ASC staff adopted a functional approach for their House of Fraser archive. Description was organised round functions, activities, companies, persons and records, to accommodate the changing ownership of stores and evolution of companies within the group, and allow researchers to move flexibly through the catalogue (Paterson, 2009).[162] However, despite these successful implementations, function-centred descriptive models have not been taken up, possibly due to the lack of off-the-peg tools through which to implement them, as Yakel warned.

Similarly, if archivists are going to embrace RiC, they need methods to implement it technically. RiC's authors propose the use of Resource Description Framework graphs to represent the model's entity relationships, but they deliberately avoid specifying how descriptive data should be output (Expert Group on Archival Description, 2023). A few services have already developed RiC-based catalogues, or are working on them. The National Archives of Finland built its AHAA catalogue in the 2010s, based on CIDOC-CRM and early iterations of RiC. However, it is only used internally at present, not on the public web interface (Kilkki, 2014). TNA is currently in the process of developing a new catalogue informed by RiC's data model (Green and Lawrence, 2022). Smaller organisations have experimented with RiC-based approaches. For example, the archivist responsible for the collections in the Centre for Chinese Contemporary Art in Manchester

[161] GASHE ran 2000-2002; ASC delivered an extension project 2003-2006. The portal is no longer online.

[162] See www.housefraserarchive.ac.uk (accessed 19 Aug 2024). Catalogue development was delivered through an AHRC-funded project (2006-2009). A model of entity relationships is available in the About/Catalogue tab.

has created a RiC-compliant, entity-based catalogue (Waring, 2018).[163] Whether RiC will be adopted by the UK archive sector and suitable tools developed to implement it remains to be seen. Either way, the concept of networks of entities, data and records articulated first in ISAAR(CPF), and now by RiC, is helpful for documenting pattern books' careers, contexts, relationships and the ecosystem of knowledge associated with them. But whether the information is visualised through technology or simply described in prose in the catalogue, it needs to be comprehensible and easily navigable, otherwise there is a risk that users will be left baffled by a complex tangle of data (Yeo, 2017; Jones, 2018). Glasgow School of Art Archives and Collections is an example of a small department with limited resources which has created a rich network of relationships to provide comprehensive, material-centred, digital access to its collections, focused on the specific needs of its core audience of creative practitioners. How staff formulated and delivered their approach is explained in the GSA case study at the end of this chapter. Examples of other projects which have demonstrated the power of linked data to enhance collections access and description have been led by the University of Brighton Design Archives and the Science Museum Group.

The University of Brighton Design Archives used linked data to build a prototype data visualiser which could provide visual routes into and across design archives based on people, organisations, subjects and events (collectively referred to as entities) instead of collection structures.[164] The visualisations presented relationships between people, organisations, events and records in the collections and allowed users to explore the mesh of connections among these entities, between entities and collections, and across collections. To achieve this, the project team wrote seventy in-depth authority records covering designers, manufacturers and events associated with mid-twentieth century collections in the Design Archives and The Council of Industrial Design's 1946 *Britain Can Make It* exhibition. These were accompanied by skeleton records for another 800 people (Kisby, 2016). Unfortunately, as Stevenson (2018) conceded, project planning did not rigorously address digital sustainability. Consequently, issues with software compatibility, upgrades and security meant the website was taken offline in 2018, so it is not possible to see how it functioned, but the project's findings did inform the redesign of the Archives Hub's architecture and website in 2016. The Science Museum Group's

[163] The catalogue is available at https://archive.eseacontemporary.org/index.php (accessed 19 Aug 2024).

[164] *Exploring British Design* (2014-2016) was funded by the AHRC; the project partners were the Archives Hub and the University of Brighton Design Archives.

Heritage Connector project asked how technology could link identical, similar and related heritage objects within and across catalogues and other sources.[165] The project team successfully created relationships between thin Science Museum Group (SMG) and V&A catalogue records, digitised collection objects, the SMG blog and journal, and entries in Wikidata. The team trialled three digital technologies: AI (specifically, Natural Language Processing, named entity recognition and entity linking) to link catalogue records; linked open data for structuring; and knowledge graphs to store links and make them accessible. Including the blog and journal proved critical, as the rich descriptive data and stories they contained about the collections forged connections which could not have been generated from the catalogue data alone (Winters *et al.*, 2022). While both these projects demonstrate how networking collections data can enrich digital access, the work required to deliver them makes them difficult for archive services to implement across their collections. Stevenson acknowledged that the time project staff took to create detailed person records for the design archives cannot readily be replicated at scale, and explained that the Archives Hub's redesign combined manual and machine methods to do this task. The *Heritage Connector* project report similarly makes clear the amount of technical work which was necessary to achieve its outcomes.

Collaborative working

Connecting institutional and researcher data could build a rich ecosystem of knowledge about pattern books. But many custodians, lacking expert knowledge and guidance, are uncertain how to start cataloguing pattern books effectively. To overcome this, GLAM professionals managing, or interested in, textile heritage collections could profitably work as a community, informally and through the Dress and Textiles Specialists Network, to share knowledge about records, textiles and textile manufacturing and develop cataloguing methodologies for pattern books. Archivists from services holding records originating from the one company could pool their research into the company's history, the records' functions and textiles' manufacture. Perhaps they could even share or co-write descriptive elements, authority records and subject terms. Jane Milosch, a former Director of the Smithsonian Provenance Research Institute, believed it made sense for museums holding similar objects by one maker to share catalogue descriptions and research (Milosch, 2021). Librarians responsible for early printed books share data and resources through the Consortium of European Research Libraries, whose public database containing material-

[165] The project was part of Towards a National Collection and ran 2020-2021, www.sciencemuseumgroup.org.uk/projects/heritage-connector (accessed 19 Aug 2024).

rich descriptions of incunabula enables librarians and researchers to search evidence relating to bindings, decoration, annotations, ownership and other criteria. In addition, its website hosts lists of related resources.[166] Harmonised terminology and descriptions also support cross-institution data sharing (Anderson, 2006) and, as the survey participants identified, researcher discovery. SCAN staff wrote standard administrative histories for common local authority bodies, such as school boards, and used these texts to amplify SCAN's name authority records (Mildren, 2004, pp. 24–25). Looking beyond local data exchange for specific collections, textile heritage custodians could collaborate to produce sector guidance about record types and functions, the description of documents and textiles, controlled vocabularies and colour referencing.[167] Information-sharing with custodians of machinery, artefacts, sites and garments, and the research community, creates a wider pool of knowledge and helps to make often fragmentary and dispersed resources more visible and accessible. One museum curator described how she has oversight of pattern books, artefacts and textiles relating to the area's historic textile industry. As she does not consider herself a textile specialist, she collaborates with local experts (many of whom used to work in textile manufacturing) on joint exhibitions and activities (Museum Curator, 2022). Subject specialists could be invited to review collections and assist with cataloguing. The Ballast Trust runs a service cataloguing technical records from businesses in engineering, textile manufacturing, transportation and other sectors, with cataloguing led by volunteer subject specialists (Slaven and King, 2018). Collaborative working could extend to digitisation, as Forde, Paul and Smith have outlined. In particular, GLAM institutions holding related collections could work in partnership to digitise records, enhancing access to dispersed assemblages of records and potentially enabling smaller institutions to access equipment and expertise otherwise unavailable to them (Anderson, 2006).

[166] See www.cerl.org/resources/main (accessed 19 Aug 2024).

[167] Velios (2023) suggests that archivists would benefit from training to identify and record material evidence, something that conservators or researchers could assist with.

Glasgow School of Art case study

The Glasgow School of Art was founded in 1845 as a Government School of Design, whose remit was to improve design practices within the manufacturing industries; these schools are examined in the review of Lochrie's research in chapter 1. Today, GSA is a specialist, independent, Higher Education institution for the visual creative disciplines, offering studio-based, practice-led teaching within a community of 3,500 students and staff. The School's primary teaching and research areas are architecture, fine art, design, design innovation, and digital visualisation and interaction (The Glasgow School of Art, 2022). The GSA's Archives and Collections department preserves, and provides access to, GSA's institutional archives, as well as records and artefacts from staff, students and other individuals and businesses associated with the School. The artefacts span metalwork, sculpture, ceramics, textiles, furniture and artworks and include items acquired for teaching purposes. Collections are available to School staff and students and external researchers (GSA Archives Team, 2023).

Prior to 2006, catalogue data was recorded in various paper catalogues and digital files. In 2006, GSA started using Axiell's CALM cataloguing software, which had been made available through SCAN, and began the process of amalgamating catalogue data into one electronic resource. The CALM catalogue helped Archive staff to respond to conventional historical enquiries. But *Awaken*, a joint project undertaken by Archives and Collections and GSA's Textiles department in 2008-2009, highlighted the catalogue's inability to supply the information the Textiles staff were seeking (Kaye and Waters, 2023). Textiles department staff had been invited to select items from GSA's archives as inspiration for new work. They were particularly interested in items' material qualities, e.g. what they were made of, how they were made, their colour and pattern, but the catalogue did not include these details, and images were scarce. Consequently, Archive staff had to rely on their personal knowledge of the collections to identify suitable items (Magee and Waters, 2011). They realised that their core audiences - GSA staff and students - are very visual and, instead of approaching the collections with specific search criteria in mind, want to browse and be surprised (Kaye and Waters, 2023). Research by one of GSA's librarians into how art and design students approach resource discovery confirmed that these students prefer browsing to structured searching, seek image-based resources as well as text-based material, and value serendipitous encounters with unlooked-for items: all things that the GSA catalogue did not facilitate (Kaye, 2023).

Catalogue, digitisation and website

GSA staff identified a number of actions which could facilitate browsing and improve visual description and access in the catalogue, such as expanded descriptions, extensive indexing, strategic, comprehensive digitisation, and public access to the catalogue so that users could be self-directed (Kaye, 2023; Kaye and Waters, 2023). The first iteration of GSA's online catalogue[168] went live in December 2014 (GSA Archives Team, 2018) - despite every aspect of the department's work being derailed when a major fire in the GSA's Mackintosh Building on 23 May 2014 caused extensive damage to the School's built heritage and some of its collections. The fire was a calamity but, ultimately, opened up new opportunities for Archives and Collections to expand their collections management and audience engagement. Fortunately, although they were housed in the Mackintosh Building, the majority of collections were stored well away from the fire and were unharmed.[169] Nevertheless, as the Mackintosh Building was unusable, all the collections had to be decanted. From then until Autumn 2015, when staff and collections moved into The Whisky Bond, researcher access was limited to the online catalogue. The situation underlined the historic value of the School's collections, and their vulnerability. It demonstrated that comprehensive catalogue metadata and digital images underpin robust collections management, aid preservation, offer ongoing public access to collections when physical access is unavailable, and, in the case of disaster, provide a surrogate when the original is lost or irreparably damaged. Staff were acutely aware that, for those items which had been destroyed, the catalogue description and any images which existed constituted the sole surviving record. One positive outcome was that internal funding was made available for a comprehensive programme of digitisation, cataloguing, conservation and outreach, which ran from 2015-2021 (Kaye, 2023; Kaye and Waters, 2023).

Work to grow digital access to collections information, records and artefacts, through the recovery programme and since, has focused on, first, the development of the catalogue as a visually rich, browsable discovery and information resource and second, systematic and comprehensive digitisation. The staff want the catalogue to fulfil the needs of academics seeking detailed descriptions and copyright data and the desire of GSA staff/students as creative practitioners to explore and be surprised (GSA Archives Team, 2019b).

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[168] GSA moved its catalogue from CALM to Archon software in 2013. When Archon was discontinued in 2018, they switched to AtoM. An external developer configured AtoM to GSA's requirements and provides ongoing maintenance and development.

[169] The Mackintosh library, virtually all its contents and the School's collection of oil paintings were destroyed. The textile collections and some archives suffered water damage, but were successfully cleaned and stabilised.

Approaches have to work equally well for artefacts and records, as collections staff (and users) do not distinguish between them and everything is catalogued using the same record template (Kaye and Waters, 2023). The recovery programme enabled some uncatalogued collections documenting the School's history to be processed (GSA Archives Team, 2022a). Existing descriptions have been enhanced and physical properties such as the medium (paper, pastels) and object dimensions noted, where appropriate; textile designs have been described (Kaye and Waters, 2023).[170] The catalogue has also been extensively indexed to facilitate browsing and discovery. Subject terms (taken from the Getty Art and Architecture Thesaurus and UKAT) and place authority records allow users to explore by topic and/or geographical location. A timeline of notable events in the School's history leads viewers to associated artefacts and records via date tags. Finally, keen to build up the catalogue as an information resource, staff have written in-depth person authority records for people and organisations who created items in the collections, or who are their subjects, e.g. the sitter in a portrait, and linked these to the catalogue records. This network of subjects, places, persons and dates enables users to follow pathways through the collections or jump in randomly and meander wherever their curiosity leads them. The new online catalogue was launched in June 2019 (GSA Archives Team, 2019b; Kaye and Waters, 2023).[171]

Work on the catalogue has been complemented by a comprehensive digitisation programme. Staff decided to use recovery programme funding to digitise all GSA's textiles (557 items) and the entire art, design and architecture collection (collection reference NMC, 2,607 items), comprising sculpture, metalware, ceramics and works of art on paper, including prints, sketchbooks and architectural drawings. Early student registers, annual reports and the heavily used poster collection were also digitised (Kaye, 2018; GSA Archives Team, 2019a). Objects were photographed from all angles, with additional shots of detailing and signatures. Textiles were photographed front and reverse, and close-ups captured fine details. In total, 65,000 digital images were generated. Since the end of the project, digitisation continues as time and resources allow (Kaye, 2018, 2023; GSA Archives Team, 2022a; Kaye and Waters, 2023).

[170] Dimensions are given for plans, but as most archive collections are not catalogued to item level, document dimensions are not usually recorded. For an example of a textile description see NDS/F/21, a piece of eighteenth-century Greek embroidery.

[171] https://gsaarchives.net/catalogue/ (accessed 27 Sep 2024).

Digital access has been further enhanced by a new website, launched in 2022. Four curated pathways - materials, themes, people and highlights –provide a wealth of routes into the collections. For example, the People pathway features seven artists, designers and architects. An introduction to each person flags up related collections, people and organisations listed in the catalogue, showcases selected items, and provides a link to all the entries in the catalogue indexed with that subject/person. Throughout the website, images are linked to their catalogue record so users always have direct access to the catalogue information (Kaye and Waters, 2023). Announcing the launch of the new catalogue, staff explained, 'The approach has been to surface the Archives and Collections content more seamlessly, add more browsable, engaging pathways into the collection and present the other features of the A&C service in a more complementary, contemporary and user-friendly fashion.' (GSA Archives Team, 2022b).

Learning and next steps

Creating digital access to collections raised questions about copyright and what GSA considered effective practice for imaging collections and presenting digital images online. Archives staff decided to photograph objects against a white background and edit out hands and supports (Kaye, 2023). No scale is included. The staff acknowledge that, as a result, images do not effectively convey the size of an object and consequently, that the impact of tiny or large objects is lost online. Some items were too fragile to handle and were therefore photographed in their container, for instance, a silk dress worn by Glasgow entrepreneur Miss Cranston (GSA NMC/0436; Kaye, 2023). A selection of volumes have been digitised in their entirety and can be viewed as single page images or via a carousel-type display.[172] The staff experimented with 'turning the page' viewing software to publish the early alphabetical registers of students, as they felt that the stitched double-spread view and animation offered a sense of the register as a physical book. However, they now use different software, which does not offer the page-turning animation but is IIIF-compliant, can support high-resolution images and offers users a choice of viewers (Kaye and Waters, 2023).

Archives and Collections staff have had to work out their own approach to managing copyright risks, as they discovered there was scant advice to draw on. All traceable rights owners were approached for permission to publish images of their property online, and all

[172] See, for example, Jessie Keppie's photograph album (GSA DC 004/9), https://gsaarchives.net/catalogue/index.php/dc-004-9 (accessed 19 Aug 2024).

were happy to give their consent. Where the copyright holder could not be traced, the staff published a low-resolution image and limited permitted usage to research and academic. For new accessions, they have introduced a clause in the accession agreement addressing permission to digitise (Kaye and Waters, 2023). In the catalogue, the licence and terms of use are displayed under each image. Metadata (file name, format, size and date uploaded) for each digital image is supplied, and permanent identifiers support the citation and re-use of catalogue records, as well as improving digital resilience.

Archives and Collections benefits from being part of a creative Higher Education institution, where inter-departmental partnerships and access to advanced technologies lead to new ways of interpreting collections. In 2018, the School of Simulation and Visualisation created the *Story of Laocoön*, an immersive 3D exhibit of one of the GSA's plaster cast statues. The team created a life-size, 3D representation of the cast from laser scans, photographs and video footage capturing the Laocoön statue in its damaged state following the 2014 fire. The immersive experience, which audiences accessed via VR headsets, was augmented with images, videos and an audio narrative, documenting the cast's history at GSA (GSA Archives Team, 2019c).[173] The School worked with the Archives to explore the concepts of digital loans and digital display in the context of GSA's Mackintosh furniture collection. They wanted to see how advanced technologies could record items of furniture and render them for public display, paving the way for digital loans of collection pieces, as well as potentially recreating furniture which was lost in the Mackintosh Building fires. They tested the concept on extant pieces of Mackintosh furniture and created the Mac(k)cessibility augmented reality app, through which the 3D visualisations can be viewed; they are also available via the catalogue (Kaye, 2023). The visualisations allow viewers to explore a piece of furniture digitally in ways that would not be possible with the physical object, for example, looking at the underside or zooming deep into the repoussé work, thereby enhancing study of the object's construction and design.[174]

[173] The laser scanning was undertaken to document the Mackintosh Building's structure and incidentally captured casts which were present in the spaces being scanned. As a result, the Laocoön cast data needed considerable processing to make it usable. The photographs and video footage were taken during conservation work following the 2014 fire. The immersive was intended for the re-opening of the Mackintosh Building, where the conserved statue would be on display, but the 2018 fire destroyed the statue and put paid to the planned events (Jeffrey, Love and Poyade, 2021).

[174] *Mac(k)cessibility* https://gsaarchives.net/explore/mackcessibility. One example is the order desk made for the Willow Tea Rooms (MC/F/51, https://gsaarchives.net/catalogue/index.php/mc-f-51, accessed 19 Aug 2024).

GSA Archives and Collections staff continue to develop the catalogue and are currently exploring the possibility of using algorithms to determine collection objects' predominant colour(s), as users want to search by colour. New accessions and existing holdings are digitised as time permits and the team welcomes projects which engage creatively with their collections. User feedback collected when the catalogue moved to AtoM and again when the new website was launched has assured staff that the School community finds these resources rewarding to use. Material properties and evidence form part of discussions with students during Archives workshops. Overall, access to the collections has been transformed from the situation in 2008. However, Waters feels that it would have been easier for staff to decide what actions would effectively help them achieve their aims if more advice had been available for institutions like them, operating with limited resources but interested in undertaking material-centred description and digitisation (Kaye and Waters, 2023).

Conclusion

Providing digital access to pattern books can be complicated and time-consuming. There are technical factors to consider, including the publication route, platform affordances and the sustainability of digital data formats. Custodians need to accommodate the requirements of existing core audiences and, preferably, those of potential new audiences approaching collections from other perspectives. Given that coverage of collections in catalogues or digital galleries is often partial and uneven, archivists require ways to communicate to users why these particular items were chosen, place them in their wider context and draw attention to the collections which have minimal or no digital presence. Archivists do aspire to publish sufficient descriptions of pattern books, accompanied by images, but are hampered by the realities of tight resources, institutional priorities and a lack of specialist knowledge and guidance. Detailed data about the creation and careers of specific pattern books and their embedded textiles, and their relationships to people, organisations and other records, may exist, but can be dispersed between several parties, with only a subset in the public domain. Placing data in the public domain where possible, and linking it provides context, reflects the multiple facets of records' careers and aids discovery. It can communicate changes in ownership and arrangement and, as the *Exploring British Design* data visualisation project discovered, reveal unexpected connections. Building networks of data takes time, research and suitable tools, but it can be undertaken incrementally.

The Glasgow School of Art case study demonstrates how staff have addressed questions about audiences, materiality and discovery; their approaches can facilitate digital access to pattern books. Using standard archival cataloguing software and methodologies, staff have created a catalogue which addresses the desire of their core users to explore visually and serendipitously, and the needs of researchers who want to conduct targeted, text-based searches. As the project survey illustrated, some textile researchers seek specific data and others visual detail, so the GSA's model offers a way to accommodate both sets of requirements. The images in the GSA catalogue form a rich resource, but it is regrettable that archives, including pattern books, have largely been excluded from the digitisation programme, meaning that researchers may overlook them. However, the pattern books' lack of images has been mitigated with subject tagging and accounts of their contents, including the type of fabric present and descriptions of samples' designs, which will aid their discovery by other means. Although it cannot be done for most pattern book samples, GSA's decision to digitise the reverse of loose textiles allows researchers to study the weaving process and could usefully be adopted by textile heritage custodians.

To help archivists address the challenges of providing digital access to pattern books, identified in the findings, this chapter proposes that GLAM professionals and the research community collaborate to share expertise, pool information about individual collections and companies and identify, describe and contextualise pattern books. The development of sector guidelines for cataloguing and digitising pattern books would assist non-specialists, foster consistent, precise terminology, facilitate data-sharing and user discovery and suggest approaches for material-centred digitisation. Digitising entire pattern books is probably not a priority for most services, especially as many researchers continue to value in-person access, but publishing one or two carefully chosen page images allows researchers to see what type of data and textiles a record contains and evaluate its potential relevance to their enquiry. The topic of sector guidance is taken forward in the next chapter, where a framework for creating material-rich access to pattern books is articulated.

Once the textile designer was satisfied with their leno curtain design, it was drawn on graph paper to show exactly how to set it up on the loom. The hand-painted colours indicate the solidity of the fabric, not a colour scheme for the finished curtain. Red paint depicts opaque cloth, orange slightly less solid areas and green semi-sheer effects, while white indicates the sheer lace. The sunburst design on the leno sample below illustrates what this interplay of opaque, semi-sheer and sheer looked like on the fabric.

Figure 38. Paper pattern to set up loom and sample of leno fabric, David Ligat & Sons Ltd., early 20th century (ASC UDG093/2/1/1 and UGD093/1/3)

Chapter 7 A framework for digital access

This research project used pattern books and their textiles as a case study to explore the material qualities of records and archivists' engagement with them. It sought to identify effective practice for communicating the material properties of pattern books in the digital sphere. The primary research questions the project addressed were, 'Why do the material features of archives matter?' and 'How do archivists engage with archives as material artefacts?'. The research examined the quantifiable and unquantifiable qualities of pattern books and textiles (chapters 3 and 4). It demonstrated that they embed valuable evidence about the artefact's creation, intended purpose, usage, care and management, and that that evidence can be critical for clarifying or even contradicting what the record's context and contents imply. The project explored archivists' relationship with materiality (chapters 3, 4 and 5), looking at the impact of theory and methodologies on archivists' perspectives and the reality of archivists' practice, priorities and aspirations in the workplace. As well as using pattern books to explore the questions relating to materiality, the research project asked, 'How can archivists describe and image pattern books and textiles to effectively represent and communicate their material properties and physical context digitally?' and What are the affordances of the digital sphere for pattern books?'. It investigated how digital technologies can, and indeed are, being used to present and analyse material features of pattern books and textiles (chapters 4, 5 and 6). It examined the questions researchers are posing of these important remnants of the textile manufacturing industry, the difficulties they experience in accessing them and the challenges the records present to archivists (chapters 1 and 4-6). This chapter discusses the findings from this research project and presents a framework for creating material-rich digital access to pattern books.

Why materiality matters

The project's thorough examination of the quantifiable and unquantifiable material qualities of archives, focusing on pattern books and textiles, identified that they embed a wealth of evidence about their creation and function, the way in which they have been used over time, and who used them, evidence which informs reading of their content and context. The size, mass and material components reflect the original owner's preferences and requirements, for example, for a portable, convenient, pocket notebook with integral blotting paper. A record's appearance and the arrangement of its contents indicate its likely function and status, distinguishing smart show books designed to win customer orders from prosaic factory floor day books. Colour signals purpose, juxtaposing pink

blotting paper with cream writing paper. Colour can be functional, using teal-coloured paper to show off pale muslins. For textiles, colour is critical to marketability and customer appeal. Texture, sound and even smell convey information about what records and textiles are made of, how they have been treated, their function and what the experience of handling or wearing them would have been. Vinegar-dowsed letters, tissue-thin letterpress paper and iridescent taffeta speak of infection control, business management and manufacturing processes respectively. Physical evidence of wear, handling, storage and repurposing, such as worn corners, ingrained soot, (re)labelling and water stains, provide clues to interpret the career of a record, be they Farge's untouched, dusty, French police files (2013) or dye-splashed recipe books. Even dust and proteins embedded in documents are yielding fascinating evidence of past users and places the documents have been (Rudy, 2010; Knight, 2018). The research made clear that the core components of a record are most definitely content, context *and* structure, and that evidence residing in a record's form, mass and materials plays an important part in assessing a document's proposed and actual function, authenticity, use and users.

Form, structure and materials are familiar points of discussion when archivists consider the physical features of records. But the research also examined the importance of physical context, which receives less attention. Archivists understandably want to remove records from the plastic bags and acidic envelopes they arrive in and transfer them to clean, acid-free boxes and folders. But as Jenkinson (1937), Rekrut (2005) and Yeo (2010) underlined, the form and appearance of records' bindings and wrappings, and the filing data written on them, convey important information about how their owners used, curated and perceived them, and should be documented. Changing records' appearance impacts how researchers perceive them. Martin Conway stored his photographs in a series of ready-made red boxes, labelled with handwritten, white filing labels (The Courtauld, 2024); FHK Henrion housed his design archive in custom-made boxes (Breakell, 2023). If the archivist transfers these photographs and design records into identical archival folders, the creator's individual expression is lost and researchers will not be able to read the evidence embedded in the wrappings about the owner's curatorial choices and how much attention they devoted to the care of their records.

Physical context goes beyond wrappings to the organisation and storage of a body of records and how that provides evidence of who had access to the documents, the purposes they served or how an organisation functioned. Seeing how the Countess of Sutherland had filed her correspondence gave Henderson (2023) fresh insights into her subject and led

her to further batches of letters. By analysing which series of documents were stored in which rooms in Dordrecht Town Hall, Horsman (1999) understood who did, and did not, have physical access to each series and hence, the purposes for which the records were used. When Breakell (2023) saw photographs of Henrion's office, she recognised that the carefully curated series of custom-made boxes were not just a practical solution to a storage problem: they were also a way for Henrion to signal his achievements to clients and curate his legacy. Textile samples cannot be fully understood in isolation. Working chronologically through Johnson & Co.'s collection of pattern books allowed textile designer Donna Claypool (2024) to tease out how the firm's work evolved stylistically and how quickly they responded to contemporary design trends. Archivists have to balance preserving the records with preserving evidence of their past lives. The act of removing them from their owner's shelves cannot be avoided but can potentially be documented. In the same way, if documents need to be repackaged on accession into the archives, the state in which they were received can be logged. Having documented this evidence, archivists need to find a way to make it accessible, so that researchers can use it to inform their interpretation of the archives.

Finally, cultural heritage professionals and researchers articulated how seeing, touching and interacting with physical, tangible, historical objects like books and textiles made them feel connected to the past owners, places and events the objects represent. Smoothing a piece of cloth woven two hundred years ago or spotting dye-stained fingerprints left by a hurried worker help audiences to bridge the gap between past and present. A scribe's comic drawings in a medieval manuscript or textile worker's jokey annotations in a daybook[175] make otherwise unknown individuals someone the viewer can relate to. Physical evidence of the skill with which local textile workers wove and finished fabrics can rekindle pride in a community struggling with the loss of that industry and facilitate conversations about past and present realities and aspirations. While museum objects are usually behind glass or beyond touch, archive users are free to turn through archives at their own pace in the searchroom, engaging their senses in the artefacts and connecting with the stories they hold about their making, the lives they allude to and the places in which the records resided (Richardson, 2023). Providing audiences with opportunities to form those connections is an important element of archival work, be that through description, hands-on access in the searchroom or learning and engagement activities.

[175] Cordale printworks employee James Pickup called himself 'Jacques Enlever' in his dye recipe notebook (NLS MS.17975).

Placing archives in the digital sphere removes that tactile engagement but, as this project has demonstrated, can offer alternative, equally rich opportunities for audiences to engage with the materiality of records and the past they share.

Archivists' relationship with materiality

The second question this research project examined was archivists' engagement with archives as material artefacts. Despite Western European and North American archival theory identifying context, content and structure as the core, inter-related, components of archives, descriptive standards and methodologies, professional literature and archival studies have concentrated almost exclusively on analysing and communicating intellectual context and provenance. The research examined reasons for this imbalance and looked at what archivists do have to say about structure. Influential nineteenth- and early twentieth-century theories prioritised context because they were defined by government archivists managing administrative records in national archives, and they mainly required contextual information. Subsequent theorisation by postmodern theorists within and outwith archival studies reflects, in turn, their concerns about power, control, inclusion and transparency in archival practice (Buchanan, 2023). As archival studies has extended its theorisations to encompass born-digital records, it has reconceptualised records as data objects, further minimising the role of their physical form and structure (Cook, 2001a; Yeo, 2007; International Council on Archives, 2016) – despite digital records' decidedly real and potentially troublesome physical qualities. Early finding aids were intended for internal collections management, not (unmediated) user access. Archival descriptive standards, which started to be developed in the 1980s, inevitably mirror the theoretical environment in which they were written and privilege the description of intellectual context. As Rekrut (2005), Janes (2012), Velios (2023) and Breakell (2023) have argued, ISAD(G) and similar standards do not readily accommodate descriptions of documentary form and appearance, making it difficult for archivists who administer materially significant collections to incorporate this information into catalogue records.

Despite the physicality of records finding little expression in theory, methodology and discourse, it is clear that the majority of archivists are acutely aware of the physical mass of their holdings. Unless their role relates solely to managing digital records, many handle records daily as they accession, clean, package, shelve, produce, read, assess and catalogue collections, or assist researchers. As Sykas (2001) described with regard to pattern books, archivists wrestle to accommodate records appropriately in inadequate storage. They

worry about the impact of unsuitable environmental conditions on paper, parchment, wax and ink. They discuss shelving, humidity, packaging, lighting and book rests in professional gatherings, formally and informally. As archivists handle and manage archives, they acquire what Buchanan (2023) describes as 'craft knowledge', that is, knowledge acquired through practical experience, and they use this knowledge to read physical evidence, assess documents' function from their structure and layout, and evaluate condition. But, as Buchanan pointed out, this facet of professional work is rarely discussed formally or published on, despite being considered a core component of archival formation, because, she proposes, it is difficult to define according to standard criteria and not seen by archivists as a credible topic to address in scholarly literature. This makes an interesting comparison to professions like medicine, say, where knowledge acquired through practical experience is, arguably, considered essential to the role, promoted as an asset and seen as equal to doctors' scientific learning.

The project uncovered abundant evidence that many archivists are not only aware of the general mass of their collections but also think about individual records as material artefacts. They perceive that seemingly mundane, ephemeral documents like posters embed rich evidence about social and manufacturing history (Southwark staff member, 2022) and describe material features, showcase them to audiences, collaborate on material-centred projects and reflect on material evidence, encounters and connection. ASC's archivists have long engaged with documenting the physical features of their collections, be they beer mats, carpet designs or Turkey red samples (Paterson, 2023). GSA's collections team, spurred on by the realisation that their catalogues did not facilitate the material-centred access their core audience of creative practitioners desired, have enriched physical descriptions and created visual digital routes into their collections (Magee and Waters, 2011, Kaye and Waters, 2023). Sunny Banks Mills' *Weaving the Web* project placed the materiality of the archives, artefacts and textiles at its heart and its 360-degree digitisations were intended to encourage viewers to explore the unique physical characteristics of the chosen objects (Moaby, 2022). West Yorkshire Archive Service and Bolton Museum collaborated with Textile Design students to elicit creative responses to letters, maps, diaries and pattern books (Carter, 2016; Claypool, 2020). These activities, and others like them, show that practice is underpinned by archivists' awareness of the value of material evidence for interpreting archives, building connections with the past and inspiring new work.

While many archivists do not articulate their engagement with materiality formally, a small body of archivists has encouraged the sector to engage with the questions it raises. During the twentieth century, archivists such as Galbraith (1948), Ellis (1965) and especially Hugh Taylor (1995, 2003) advocated the archive sector to pay more attention to the importance of material evidence. While their views did not gain much traction, over the past fifteen years, archivists, researchers and creative practitioners have brought archival materiality into professional discourse and into wider conversations in the cultural heritage sector about affect, material engagement and human-object relationships. Conferences, symposia, articles and books are being devoted to the subject. These advocates draw on a range of theoretical perspectives to analyse affect, connection, physical context and curation. Rekrut (2014) and Breakell (2023) have unpicked how material evidence supports interpretation of archives' intended function and actual use, and Velios and Pickwoad (2012) have highlighted how that material evidence also elucidates records' provenance, production and careers. Breakell and Russell (2023) have explained how documents are material artefacts which embody and convey meaning. Dever (2013) and Richardson (2023) argue that situating documents within their physical context is essential. Meanwhile, Brown and Duguid (2002), Lester (2018) and Wiggins (2023a) have discussed how records' form, materials and appearance shape interactions, engage audiences on an intellectual, sensory and affective level, and foster connections. Critically, all these advocates are applying these theories to archival practices, including description, exhibition-making and audience engagement, demonstrating how they are relevant to, and can enhance delivery of, everyday archival activities.

The archivists who do engage with materiality find it difficult to capture and convey the rich body of material evidence they see through description and digital imaging. Staff may lack the specialist knowledge to identify and describe materials and processes. Lack of time means collections are processed at series or folder level, making it awkward to document material features meaningfully. Staff struggle to fit descriptions of physical qualities and relationships into catalogue templates based on ISAD(G) and other standards (Rekrut, 2005; Jones, 2018; Velios, 2023). Bodies like the Group for Literary Archives & Manuscripts and the Ballast Trust have produced cataloguing guidelines for literary papers and technical plans respectively, but guidelines for cataloguing pattern books are lacking, particularly for archivists approaching them as information objects rather than as design artefacts. As a result, each institution has had to devise its own approach, which leads to inconsistency across the sector, makes cross-institutional data-sharing awkward and

complicates discovery for researchers (Paterson, 2023). Humanities scholars and librarians have demonstrated how material-centric approaches to digitising books and documents can showcase structure, materials, texture and evidence of user interaction and enable audiences to explore physical properties in ways that are complicated to undertake on the physical artefact. But the archive sector lacks examples of how these techniques can be applied to archives and many repositories lack access to the funding, equipment and skills to implement them.

Describing and digitising pattern books and textiles

In addition to the primary research questions discussed above, this project set out to develop a framework for digital access to pattern books and textiles. It addressed two further questions, namely, 'How can archivists describe and digitally image pattern books to effectively represent and communicate their material properties and physical context?' and 'What are the affordances of the digital sphere for pattern books and textiles?'. Digital representations of archival artefacts often float in space and lack any sense of heft and tangibility; information about their physical context may be invisible or hard for researchers to discern. The project asked whether and how digital practices could enhance, rather than diminish, pattern books' physicality and questioned what effective, material-rich description looks like for textiles and pattern books. It recognised that facilitating digital access also involves finding suitable platforms on which to publish the data, sourcing funding, harmonising terminology and ensuring that digital resources are durable. It understands that there cannot be one definitive approach, because each service has its own institutional priorities, departmental objectives and target communities of users. The archive sector has been struggling with cataloguing backlogs, retro-conversion, standards, electronic systems, online discovery, funding and capacity ever since digital tools became widely accessible around the Millennium and it is apparent from the institutional case studies that these challenges persist. Clearly, any action on pattern books may be slow, incremental and dependent on pockets of external funding. The project therefore proposes a pragmatic, incremental, strategic and collaborative approach, based on examples of what the author considers 'effective' practice, rather than a notion of 'best' practice, whatever that might be (Coffield and Edward, 2009; Patton, 2015). Well-laid foundations allow catalogues and digital representations to be expanded and enriched, should the opportunity arise.

Framework for digital access to pattern books

Description

- Choose terminology to accommodate expert and non-expert audiences
- Exploit description's ability to communicate structure and texture
- Develop web of linked name/place authority records and subject terms to enhance routes into collections

Digitisation

- Define relationship between digital and physical versions
- Capture material features and physical context
- Enable use of basic digital tools to analyse physical features
- Employ filmed handling to convey how a document is constructed and organised

Digital access

- Third-party sites can publish catalogues and images
- Assist collection discovery and use by employing effective search and viewing functionality
- Provide information about digitisation selection policy and gaps in catalogue coverage
- Use collection guides to surface invisible collections and signpost to resources
- Address financial, technical and environmental sustainability and digital security

Collaboration and knowledge sharing

- Collaborate with subject experts to understand collections
- Pool knowledge with other services about related holdings and work collaboratively to describe them
- Partnerships between well-resourced and restricted services can make more collections accessible
- Guidance on identifying, interpreting, describing and digitising pattern books will aid archivists and researchers

Description

Archivists describe archives to manage collections, make them discoverable, facilitate physical access and, potentially, enable online research. This project has concentrated on description's role in supporting researchers to digitally discover and evaluate pattern books and textiles. It defines effective description as sufficient to enable researchers to discover pattern books in catalogues, understand their function(s), know whether they contain textiles and ideally, what those textiles are made of and look like, and overall, evaluate the records' relevance to their research question. Digital galleries like the Glasgow School of Art's and the *Deep Discoveries* project's image-matching search tool touched on in chapter 4 offer visual ways into collections, but for the majority of platforms, textual description is crucial for discovery. Consequently, archivists need to consider who their core audiences for textile collections are, or might be in the future, what their requirements are and how familiar these people may be with industry terminology, so that they can establish what sufficient description encompasses for their service. The results from the project survey showed the diversity of topics researchers engaging with textile collections explore, from business history to conservation questions; they also showed that, while some are very knowledgeable about textiles and textile manufacturing, others do not consider themselves to be experts.

As project findings about manuscript description established, it can be difficult to reconcile different levels of user expertise in one description. Medieval manuscript cataloguers compile in-depth descriptions using precise terminology and agreed sector conventions, which provide manuscript researchers with clear, valuable information for evaluating and analysing a manuscript digitally. But, as the NLS case study participants explained (chapter 5), NLS metadata staff feel that some audiences for manuscripts in their digital gallery may be put off by the terminology and they have taken the decision to remove some of the technical detail. At present, researchers can still access the full descriptions in the library catalogue, but NLS' plans to have one description supporting all its platforms will oblige staff to make a decision about technical language. Archivists cataloguing pattern books have to resolve the same question. Knowledgeable textile researchers participating in this research project want precise terminology in catalogues - 'dye recipe book' or 'sample book' - , rather than the generic 'pattern book', and are keen to know what textiles are made of, such as rayon or linen. Those new to the field, or seeking creative inspiration, may prefer generic terms. Consequently, although archivists in a specialist textile archive used by expert researchers may wish to adopt manuscript

cataloguers' precision, the majority of custodians will probably find that compromise is required.

When it comes to communicating material features of pattern books and textiles, archivists have to consider which properties text conveys effectively and what information cannot easily be encapsulated in words. Text effectively communicates quantifiable data such as pattern book dimensions, the type of paper used, how the volume is constructed (e.g. loose-leaf binder, casement-bound), the way its contents are organised, what fibres the samples are made of and how the samples are attached to the pages. It has a valuable role in describing unquantifiable properties, such as the texture of the paper or soft silk, or the smell of mould. Features which are harder to communicate in words include designs and colours. Describing anything more complex than evenly-spaced stripes is tricky; compiling an overview of the dozens or even hundreds of samples one pattern book contains is impracticable, especially if they comprise a spectrum of designs. 'Plain weave, in a range of single colours with fine, white, horizontal stripes and superficial figuring of alternate lines of coloured crosses and stars' is a brave attempt by Satchell and his colleagues to describe a set of samples in John Crewdson's 1769 pattern book, but hard to visualise (Satchell *et al.*, 1990, p. 227). ASC staff struggled to encapsulate abstract, 1970s, Stoddard-Templeton carpet designs in a few, well-chosen words. Colours are problematic: one person's fuchsia is another's magenta. While cataloguers may wish to be specific or creative, most users probably search on basic colour words like red or pink. As Bartlett (2011) pointed out, archaeologists and curators reference colour systems to define colour on objects, but archivists do not. Chapter 3 described initiatives by Cooper Hewitt Museum and other heritage institutions to enable users to search or browse for objects in catalogues by colour. This offers exciting possibilities for textile collections, and the GSA staff are exploring whether they can develop these computer algorithms for their collections. Overall, when deciding what details to describe, archivists will need to weigh up what is pertinent to each collection. It may be important to highlight fabrics which sit outside one manufacturer's usual repertoire, such as David and John Anderson Limited's damasks (Figure 21). A key factor may be whether the repository plans to take any images of the pattern books, as words and image can complement each other and one well-chosen image can convey a design far more effectively than text.

One valuable facet of textual description is its use in building networks of linked data through name and place authority records and subject terms to create a rich web of interconnected records and data. Name authority records provide one consistent point of

reference for information about a person or organisation, are simpler to update than repeated descriptions of a company's history and can address changes in company or site names over time. Place records clarify confusion over common place names. The networks authority records create provide users with alternative ways to navigate online catalogues and discover, say, all items related to textile printing in Dunbartonshire. There has been growing interest in linked data within cultural heritage, as technology provides the means to create these digital networks. The Glasgow School of Art catalogue provides an example of how linked data allows users to navigate purposefully via named artists and their works, or freewheel across the catalogue without a destination in mind (chapter 6). Significantly, it removes the barrier of the search box which demands that the user types in a search term in order to enter the catalogue. Current archive systems like AtoM and Calm allow cataloguers to create authority files and link them to records, but do not allow them to link authority records and construct many-to-many relationships. Perhaps new tools, informed by RiC's data model, will offer expanded functionality for linked data. As authority records and subject tagging can be built up incrementally, services can implement them as opportunity allows.

Digitisation

Many archive services have digitisation on their list of priorities. As the institutional case studies showed, the scale and scope of digitisation varies hugely across the sector, from the NLS' ambitious, multi-million pound programme intent on digitising thousands of books to ASC's few hundred photographs shared on Flickr. Archival discourse about digitisation usually focuses on practicalities like resolution and file formats and has conventionally perceived digitisation as the successor to microfilming, useful for creating a surrogate to provide access to content, but not to form and materials (Moss and Currall, 2004; Prescott, 2019). Reflections on what is gained or lost when physical records are represented by a digital version, or the relationship between the two versions, are limited and archivists could benefit from learning in related fields. For example, Humanities scholars producing printed and digital editions of texts consider digitisation as an act of translation, rather than the production of an exact replica, and they recognise that conversion requires interpretive choices and compromises (McGann, 1991; Hayles, 2003). Jeurgens (2013) described digital versions of archives as new, distinct objects, because physical and digital representations have different affordances. As Leonardi (2010) advised, archivists would do well to ask what actions the form and features of each version support and what they enable users to do. For example, a digital version of a pattern book allows researchers to

access it remotely, compare two volumes housed in separate repositories and easily magnify weave patterns. Handling the physical version, the user experiences its heft, sees how it functions and feels the texture of the paper and samples. Unless the physical item has been removed from public access after being digitised, users often alternate between versions. Roberts (2016) described how digitising Loyola University Chicago's nineteenth-century library catalogue led students to engage with the old library books physically and digitally. Through their encounters, they made discoveries about the books' careers before they were donated to the library, learnt about historic bookbinding processes, and exchanged stories online with the public about past owners. Consequently, archivists thinking about digitisation need to ask not only what file format will be most appropriate, but also what purposes their digital version is to fulfil. Are they looking for a facsimile copy, a surrogate standing in for the original (Porter, 2018) or a 'digital cultural object', an enriched representation of the original intended to be used in tandem with it to enhance both versions (Campagnolo, 2020, p. 2)?

Instances of material-centred digitisation, by the Humanities community and others, have demonstrated how routine, two-dimensional photography can effectively represent physical features of pattern books, and not just capture content. Volume spines and covers can be imaged. Placing rulers and colour patches in shot communicates the object's size and helps researchers to judge colours. Angled shots highlight surface texture or sheen; photographing the reverse of textiles shows the maker's construction techniques (Kaye, 2023). Routine digital tools, like zoom, snipping and colour manipulation, enable researchers to foreground elements which pass unnoticed or are hard to see on the physical item (Turner, 2021), or compare handwriting and designs. Filming handling, which can be undertaken on a smartphone, communicates the experience of handling a document, provides a journey through its contents and showcases material features. Using these techniques to provide visual access to a pattern book's form and appearance digitally may assist researchers with minimal or no experience of physical archives to gain a sense of the record artefact and contextualise the contents.

Where archivists or researchers have access to more advanced digital technologies, they can use computers' processing power to analyse pattern books and textiles in ways that would be impossible manually (Prescott and Hughes, 2018; Endres, 2019, p. 8). Polynomial Texture Mapping for conveying gloves' knitted texture (Gallen *et al.*, 2015), multispectral imaging to see through paper designs (Burgio, 2017b) and computer vision to match patterns (National Library of Scotland, 2020c) are just some of the technologies

whose applications have been explored and discussed throughout this thesis (see chapter 4 for the main discussion) and which have benefits for textile heritage. They are beyond the scope of the average archive and are time-consuming to apply, so they are the preserve of dedicated projects and are not proposed as part of the framework for digitising pattern books. But it is helpful for archivists to be aware of what technology can offer textile heritage collections, so that they can recognise and take advantage of opportunities when they arise.

In standard digitisation, it is rare to encounter practice which captures a record's physical context. When a loom chart is imaged, the roll from which it was extracted is not usually photographed and the image shared online. Digitisers meticulously image every page of a set of pattern books representing the products of a silk manufacturer, but not the row of volumes together, showing their neatly labelled spines, or perhaps their lack of homogeneity. A photograph of the NLS' collection of Milton printworks dye recipe books, for instance, would reveal the medley of notebooks used by the colourists, suggesting that employees used whatever was at hand, rather than being supplied with notebooks made to order for the company. This project has advocated for archivists to pay attention to physical context and document it where possible. Researchers do not know how records were stored by their owners or received by the repository. Nor can they see the physical mass of a collection in the strongroom (Dever, 2019). Even if a record creator's original boxes are retained, they may not be brought to the searchroom when researchers request items from them. Digitisation can preserve and communicate information about the changing contexts of textile heritage collections as they move from semi-current records to archives and can show how they are stored in the repository. Photographing textile company records in situ prior to deposit, if that is an option, preserves a record of their final arrangement 'in the wild' for future reference, or indeed, how they were abandoned on the day the factory closed and the employees left. Photographing them on receipt captures the mass and appearance of the assemblage, as well as details of bundles, rolls and wrappers, allowing researchers (and staff) to gain a sense of the whole collection and see how the records were curated by their past, or at least their last, owners. When items or series are digitised for online access, bundles and contiguous volumes can, as suggested, be imaged to show context. The Courtauld's digitisation of the Conway photographic collection demonstrates how physical context can be successfully documented visually by including views of the storage folders and boxes in the online catalogue. Contextualising the boxes within their series adds another layer of

information about the organisation of the collection for viewers (The Courtauld, 2024). Digital tools can also portray more complex contextual information, for example, Whitelaw's visualisation of record series in the Australian National Archives communicates information such as number of items in a series and shelf meterage (*Visible Archive Series Browser*, 2012).

Digital access

The wealth of digital initiatives by cultural heritage institutions and Humanities and textile heritage researchers illustrates the possibilities for showcasing pattern books and textiles as tangible, tactile and engaging artefacts. But effective practice does not only weigh up how description and digitisation might be undertaken. It must also take account of the realities and challenges of converting analogue material to digital format, publishing it online in a way that is useful for audiences and sustaining those digital resources safely long-term. The project findings revealed that archivists encounter several challenges when endeavouring to make digital information about collections public. Making time to undertake any description work is difficult for many services. Despite collections being inaccessible without metadata, archivists testify that cataloguing is viewed as a luxury, not an essential core function (Rudyard, 2002; Senior Assistant Librarian, 2021; Assistant Archivist, 2022). All but the newest archive institutions have older catalogues in paper format and the sector has learned over the past twenty years that there is no magic solution which will rapidly and painlessly convert these catalogues into structured, searchable, digital metadata. Not least, paper catalogues use abbreviations and shorthand which need to be translated during conversion. Access to technology can be a barrier. The preferred option for managing catalogue data is probably a collections management system, but these are expensive, beyond the purse of small services like Sunny Bank Mills and may require extensive customisation to meet an institution's requirements, as ASC, GSA and Chatsworth Archives discovered (Assistant Archivist, 2022; Kaye and Waters, 2023; Head of Archive and Library, 2023). Digitisation requires not only photography equipment and software, but also sufficient server capacity to store the data and IT skills to preserve the files and manage tools, online services and security. Services which cannot make the first steps are getting left behind (Forde, 2005).

Given these challenges, publishing description and/or digital images of pattern books will probably be a slow, gradual process, but each step forward improves accessibility. As the case studies and examples in the digital access chapter (chapter 6) show, aggregators like

Archives Hub and Discovery offer an effective external option for publishing catalogue data, but not images, as Discovery does not publish images and Archives Hub's infrastructure for images is currently poor. ASC has found Flickr a useful tool for publishing collection images, which can be linked to description in a catalogue or on the website. Whatever route is chosen, how data is presented onscreen and what options are offered to search, sort and filter it have a significant impact on the user experience. Survey participants testify that poor functionality makes many online catalogues awkward to search effectively. For archives, a platform's ability to display the collection hierarchy and show where a series, folder or item fits into it, is key, but not every platform delivers (Jones, 2018). As cataloguing, digitisation and publishing digital data are always work in progress, repositories need to find a way to alert audiences to the incomplete nature of the material in the digital public domain and explain how and why the published collections were chosen (Rudyard, 2002). Critically, as collections which have no digital presence are invisible to all but the most experienced researchers, staff require a mechanism to signal the existence of these collections (Jeurgens, 2013). Subject guides, like the ones ASC has produced on textiles, brewing, mining and other industries,[176] are useful for recording the existence of uncatalogued material, surfacing collections from the depths of the catalogue and signposting researchers to fuller descriptions or images, especially if these are hosted on external platforms.

The work is not done when digital resources are created and published. Ensuring the technical, financial and environmental sustainability of digital resources, and their security, is essential for their long-term usability. Digital outputs should be designed with longevity factored in, by ensuring that the technology can be updated. If resources have been created through project funding, the service needs a plan to cover the cost of future hosting or upgrades or to establish how these resources will be integrated into core systems (Zorich, 2003; Robey, 2011). Digital security is critical, as the British Library's catastrophic experience makes clear. Lastly, as the GLAM sector becomes more aware of, and concerned about, the environmental impact of storing, managing and using vast quantities of digital data, archivists are questioning exactly what they should digitise, and how. Consequently, decisions about digital access to pattern books will have to critically

[176] Available at https://www.gla.ac.uk/myglasgow/archivespecialcollections/discover/universitybusinessarchivessubjectguides/#d.en.60649 (accessed 29 Sep 2024).

evaluate what benefits different forms of access offer researchers, how they advance the institution's aims and priorities and what their environmental footprint will be.

Collaboration and knowledge sharing

The research for this project, especially the interviews with case study participants and discussions with other GLAM professionals, underlined the huge differences in scale and scope between services in the UK archive sector. National bodies like the NLS and NHM, employing several hundred staff and with access to advanced technologies and the skills to implement them, co-exist with small organisations like Southwark Archives, Sunny Bank Mills and Chatsworth, which have three or four employees and limited financial resources. Few of the GLAM professionals who have contributed to this project describe themselves as knowledgeable about textile manufacturing and feel confident about interpreting the technical data in pattern books. Therefore, following the advice of Forde (2005), Anderson (2006), Paul (2020), Smith (2022) and project survey participants, this project proposes that archivists collaborate with other GLAM professionals, the textile heritage research community and creative practitioners to understand their textile collections better and find ways to provide effective access to them. Local experts can explain how regional industries operated and describe the products manufactured. Researchers studying specific collections may be willing to share information and interpretations. Textile students may assist with cataloguing collections, as some do at ASC. Repositories with related collections could pool knowledge about manufacturing, companies, record types and textiles. They might consider sharing or co-writing descriptions, as Milosch (2021) proposed for museums and which SCAN successfully implemented for local authority records (Mildren, 2004). This would save time, harmonise descriptions and support discovery. If institutions with expertise in textile heritage and/or greater resources were willing to partner with a less well-placed institution, as the NHM is doing with its digitisation hubs (Smith, 2022), that would help small institutions take those crucial first steps.

Archivists would also benefit from sector-specific guidance to assist them to identify textile records and describe and digitise them. Therefore, the project proposes that the sector works together to identify existing resources and produce guidelines where none already exist. The Dress and Textiles Specialists museum group has produced guides for identifying types of textiles, including lace and printed fabrics. Similar guides addressing the main types of pattern book and their functions would help archivists recognise what

records they hold and how they fit together. If they do not already exist, beginners' guides to key moments and processes in the history of the main branches of textile manufacturing, such as linen weaving or calico printing, would clarify what the records say and help date undated ones. Following the example of The Ballast Trust and the Group for Literary Archives & Manuscripts, cataloguing guidelines could explain what information should be recorded about common record types and textiles and advise archivists where to put this data in ISAD(G)-based catalogue templates. Data harmonisation is important for data sharing and access (Anderson, 2006; Paterson, 2023), so guidance about terminology and the choice of controlled vocabularies, including colour schema, would support a consistent approach across institutions. Guidelines on material-centred digitisation of pattern books and textiles could outline simple and advanced approaches, as this project has done. The ever-expanding panoply of digital tools and technologies is confusing and overwhelming, so examples of effective practice offer a way through the maze and could assist archivists to identify approaches to meet the needs of their service and collections.

A material practice

Using pattern books to examine the place and practice of materiality in archives has revealed how collecting policies have diversified over time to encompass records whose materiality is important to their interpretation. Until the mid-twentieth century, archives mainly collected administrative records from their parent body and third parties, and personal papers such as correspondence and diaries. Since then, their remit has extended to business records, archives from writers, musicians and artists, and architects' papers, to name but a few. Postmodernist theorisation about hidden and absent voices in archives, and the Community Archives movement, have highlighted the numerous communities whose history has not been documented or collected and thus remains untold in scholarship, and have in turn prompted further changes in collecting. Audiences for archives have diversified too. Academic historians share the searchroom with individuals and groups pursuing personal or community research, students from a range of disciplines, and creative practitioners. Archivists collaborate with community groups and local educational establishments to introduce people to the collections. They actively encourage a broader spectrum of society to explore archives, both to undertake traditional research and to respond creatively with their own outputs, as West Yorkshire Archive Service did with local Textile Design students (Carter, 2016). Unlike Dever's Humanities scholars (Dever, 2013), focused on content and oblivious to the page, many in these newer audiences are struck by archives' physical qualities, marvelling at the handwriting and

scrutinising hand-painted textile designs, and are keen to engage with their materiality as well as their content.

Diversification in collecting policies and audiences may be welcome to archivists but they have brought challenges. Bulky pattern books, ships' plans and beer bottles do not fit easily on shelves designed for folio volumes and boxed A4 paper. Researchers want to explore how records were made, used and curated, as much as what they say, and are asking material-related questions of collections which catalogue descriptions are not proficient at answering. Theory and methodology have not responded to this material shift. They remain rooted in documenting the intellectual context of administrative records, with new thinking focused on processing born-digital records and addressing issues of power and inclusion, leaving archivists lacking methodologies to manage material-rich collections. Voices within the profession do advocate for greater awareness of the importance of material evidence and artefactuality. Taylor (1995) urged archive professionals to recognise archives as physical artefacts, whose material form and substance influences human-record interactions. Schwartz (2002) and others have condemned content-based curation of photographs and have described how archivists should catalogue, digitise and manage them as artefacts carrying rich material evidence. Map archivists like Janes (2012) have articulated the rich physical evidence in and on maps, documenting their intended function and actual career. More recently, a new wave of advocates, including Lester, Wiggins and Breakell, are drawing on theories from material culture studies to explain how materiality functions. They are relating their findings to practice, demonstrating how material-sensitive practices can enrich the efficacy of cataloguing, public engagement and other activities. The next steps will be to encourage wider discourse and engagement within the sector on the subject.

Having spoken to many archivists, librarians and curators during this project, it is clear that they are keen to showcase their collections and encourage people of all ages and backgrounds to engage with them, both digitally and in person. They are resilient in the face of continuous obstacles with funding, resources, technology and institutional profile, and creative in seeking solutions. Archivists are accustomed to encountering unfamiliar subjects and develop their knowledge of local specialisms – dance, perhaps, or coal mining – to administer collections effectively. But textile manufacturing records' use of sector-specific terminology, abbreviations and shorthand accounts of technical processes make them opaque to outsiders. The inclusion of textiles adds another layer of complexity. While manufacturers could decode a sample's composition, structure and colouring at a

glance (Sykas, 2005, p. 11), most archivists cannot. Ketelaar observed that 'The British [archivists] are great in publishing case studies' (Ketelaar and Bos-Rops, 1997, p. 62) and this willingness to share professional learning was exemplified during the project. This collaborative ethos, and textile heritage communities' knowledge, can help archivists develop tools and practices for identifying, describing and digitising pattern books and textiles. A similar approach could be applied to other record types. Despite the lack of professional recognition of the importance of materiality, it is clear that archivists are attuned to the material qualities of records. Those with responsibility for managing pattern books and textiles value them for their beauty, their testimony to their makers' skills, and their witness to an intriguing craft which conjured brilliantly coloured textiles from vats of dung, ashes and arsenic. Archivists recognise the importance of the stories the records contain and embody about making, about technical and artistic creativity, and the communities in which they were made (Richardson, 2023). They want audiences to enjoy them and experience a sense of connection with the people and activities they represent. This project has defined steps to help archivists make pattern books accessible, has celebrated archives as tangible artefacts which embed valuable physical evidence about their creation and use, and has advocated for archivists to value records for their content, context *and* their structure.

When textile manufacturers designed and marketed new products, they had to be attuned to the latest trends and priorities and build relationships with potential customers to win orders. The Hawick combinations manufacturer who secured a contract to supply Aberdeen drapers John Falconer & Co. in 1932 recognised that Falconer's customers wanted underwear which was comfortable against the skin and did not shrink when washed. The manufacturer negotiated with Falconer's over the garment variations it could offer and agreed a price per unit which allowed both parties to make a profit while being affordable to the women who formed Falconer's target audience.

Figure 39. Advert for woollen combinations, John Falconer & Co. Ltd., 1932 (ASC FRAS/145/1/19)

Chapter 8 Next steps

Gaps in knowledge about materiality

This doctoral project aimed to improve understanding of the important role archival materiality performs in the interpretation of records and the ways in which archivists engage with records as material artefacts in their practice; it used pattern books and textiles as a case study to investigate these aims. It also sought to establish effective practice for communicating the material properties of pattern books in the digital sphere. Initial research in the literature identified gaps in knowledge about archival materiality and textile heritage research, which the project set out to address. The literature demonstrated that archival studies has not fostered theorisation about materiality and material evidence, nor research into the value of archivists' craft knowledge and engagement with records' physicality. Neither has the academy advanced theoretical understanding of how digital materiality, representation and digital translation underpin archival digitisation, as Digital Humanities scholars have done for manuscript digitisation. Articles such as Janes' account of his difficulties when cataloguing maps at TNA (2012) make clear that archivists require guidance for describing physical characteristics of records, including pattern books, and accommodating those descriptions within context-focused, ISAD(G)-compliant catalogues. The literature also revealed a dearth of studies examining how researchers search for, access and interact with pattern books digitally. A full discussion of how the project addressed these gaps and its findings is presented in chapter 7.

Contribution to knowledge

Overall, this project has enriched knowledge about the important function of materiality and material evidence in archival research and practice and has identified theoretical, methodological and practical means by which archivists can provide material-centred digital access to pattern books and textiles. The author's detailed study of the quantifiable and unquantifiable material properties of pattern books (chapter 3) has illustrated the wealth of data residing in them, and how that data informs the interpretation of the records' contents, intellectual context and career. She has brought together evidence demonstrating that information about documents' former physical contexts, preserved in wrappers, groupings and, where available, shelving arrangements, elucidates their career and how an organisation or individual conducted their business. As physical context is frequently overlooked in archival practice, she has added her voice to those advocating for traces of it to be preserved and documented and made accessible to researchers. She has explained

why archival scholarship has prioritised provenance and intellectual context and sidelined materiality, despite defining structure as one of the three core components of a record; she has demonstrated how this focus on context has impacted methodology and the formation of cataloguing standards, rendering them inhospitable for material-led practices. She has underlined that contemporary attempts to reconceptualise the nature of a record, to accommodate born-digital records, risk pushing structure further from professional view. Critically, this project has brought together a growing body of research by archivists, conservators, researchers and creative practitioners into affect, connection, physical context and curation, and has analysed their claims that theoretical understanding of how materiality functions can enhance delivery of archival practices, such as description and audience engagement. She has also highlighted how these professionals have brought archival materiality into professional discourse and discussions in the cultural heritage sector about affect, material engagement and human-object relationships. Her intention is that her research contributes to that body of knowledge and inquiry.

This project has challenged perceptions that digitisation cannot communicate material properties, by collating data from cultural heritage initiatives employing digital tools to capture and scrutinise visible and hidden material features and contexts of pattern books, textiles, manuscripts, archives, artefacts and historic buildings. While the advanced technologies employed in some projects will be aspirational for most archive services, the author has emphasized the efficacy of very simple techniques, such as using angled lighting to foreground a fabric's texture, which are accessible to all (chapter 4). Recognising that the archive sector has struggled to overcome longstanding barriers to delivering digital access, such as the expense of cataloguing software, she has addressed these, for example, by illustrating how third-party sites like Archives Hub and Flickr can be used successfully to publish collections metadata and images. She has also addressed current concerns about digital sustainability and collection invisibility (see chapter 6). Her framework for creating digital access to pattern books (in chapter 7) synthesizes the findings and proposes consistent, straightforward, practical steps archivists can take to describe, digitise and enhance digital access to pattern books as material-rich artefacts; it also offers recommendations to expedite action, such as working collaboratively with subject specialists and other archives services to pool knowledge and expertise.

Further research is required into materiality's place in archival theory, methodology and practice, and also its role in archival research, learning and connection. The importance of documenting and interpreting physical context requires much greater attention. In

particular, methodologies need to be advanced which promote awareness of preserving evidence of physical context and establish protocols for documenting it, for example, by retaining instances of original packaging or photographing records as received from the donor. To help address this, the sector needs to critically explore the balance between preserving physical evidence and preserving records by repackaging them, a debate which also speaks to concerns about sustainable practice. The contribution of craft knowledge to archival practice should also be better understood. Investigation is required into how physical description can be incorporated effectively into ISAD(G) and RiC-compliant catalogues. As consistent terminology is key to the discovery and understanding of pattern books in online catalogues, research needs to identify suitable thesauri and other protocols to facilitate the consistent description of record types, colours and materials. Allied to this is the need for user studies into textile heritage researchers' search, discovery and access requirements and the diverse ways in which they use textile heritage collections: this will help archivists to facilitate access to textile heritage collections.

Next steps

The author will seek to publish her findings in relevant journals and share them at conferences or other professional gatherings; she has already been invited to lead a workshop for the Archives and Records Association's Archives and Museums Section. She intends to engage with the community already active in researching archival materiality, to find out how they might collectively foster discussions about the role of materiality in interpreting collections and transfer theory into practice. Archivists she has spoken with about documenting physical context are keen to take practical steps to engage peers and produce cataloguing guidance for the sector. The idea of a meeting was proposed, and the author will pursue this. With regard to pattern books and textiles, the author identified the need for beginner-level guides to historic textile manufacturing, textiles and pattern books for GLAM professionals. She will investigate what resources already exist and consider how to signpost archivists to them. She is a member of the Dress and Textiles Specialists group (DATS), which provides a forum within which GLAM professionals and researchers can share knowledge and resources about textile collections and develop professional expertise. The author will reach out to this community, and beyond to archivists who may not be members, to find out more about how custodians are managing pattern books and textiles and steps they have taken to improve access. The ARA's Archives and Museum Section, a sub-group addressing interdisciplinary practice in archives, museums and galleries, has just produced a glossary

to map terms and professional standards across archives and museums. As pattern book collections are found in archive repositories and museums, and custodians manage them according to their sector-specific practices, the Section's cross-sectoral ethos and expertise will be invaluable in facilitating conversations and identifying actions which are appropriate to both contexts.

Reflection on research process

Needless to say, when the author applied for doctoral studies, she did not anticipate that the majority of her project would be conducted in the shadow of a global pandemic. Beyond the physical isolation and lack of access to campus during 2020-2021, one of the main challenges was the uncertainty, which made planning difficult. In-person meetings and events were organised, then cancelled or moved online, because the speaker had caught Covid or government rules on travel and social interaction changed. The loss of opportunities for informal idea sharing and networking was disappointing. Video conferencing was effective for formal meetings, webinars and conference presentations, but poor at replicating the spontaneity of face-to-face conversations. Surprisingly, positives emerged from the situation. Before the pandemic, only a limited number of people used tools like Skype and Zoom. When most people were confined to home in 2020, use of video conferencing became commonplace. As a result, the author was able to meet virtually with people from across Britain, as well as in Canada and Germany. Online webinars and conferences offered opportunities to engage with a plethora of research, discussion and training. As most of the project data-gathering took place in 2022, staff had had time to reflect on how their service had coped, or not, with the digital shift, and it was a pertinent moment to discuss digital access. Beyond the pandemic, it was rewarding to investigate, and find solutions to, a professional question relevant to sector concerns. People in the GLAM sector were generous with their time and knowledge and the author enjoyed thought-provoking conversations with Humanities scholars, researchers, creative practitioners, curators, librarians, archivists, conservators and archaeologists about material evidence, physical context, connection, description and digitisation and the richness of working with cultural heritage artefacts. It was satisfying to discover that others shared my belief that the artefactual nature of archives matters, and find a community reflecting on material qualities and evidence and engaging in material-rich practice.

Appendix One

The results from the project's survey of textile heritage researchers are summarised below. With regard to questions not listed below, question one related to user consent. Questions three, six, eleven, fourteen and sixteen were spaces to clarify a response to the preceding question. Thirty-five people participated.

	Questions and responses	**Number of responses**
2.	**What topic(s) does your research or creative practice focus on?**	
	Textile dyes and dyeing	17
	Textile manufacturing	25
	Clothing/fashion	27
	Art history	12
	Economic/business history	15
	Family history	8
	Social history	23
	Design	16
	Technology	12
	Museology/archives/library studies	15
	Conservation/preservation/collection care	22
	Creative practice	11
	Commercial re-use	4
	Other	9
4.	**How often do you use historical textile industry records in the research/creative projects you undertake?**	
	100% of my projects	6
	60-99% of my projects	6
	30-59% of my projects	5
	Fewer than 30% of my projects	17
	I never use them	1
5.	**How do you find historical textile industry records which might be relevant for your research or creative practice?**	
	Recommended by other people	21
	I follow up references in articles, books, conferences, etc	30
	I use a general web search e.g. Google	26
	I use online searchable catalogues which list/describe records held by archives, libraries and museums	29
	I use printed catalogues and guides	14
	I use paper catalogues and indexes onsite in archives, libraries and museums	10
	I browse online curated collections	16
	Other	6
7.	**If you use heritage organisations' online searchable catalogues, do you find that textiles are adequately identified?**	
	Most or all of the time	2
	Sometimes	21

	Rarely	10
	Never	0
	No opinion	2
8.	**Which measure would improve discovery of relevant textiles in catalogues for you?**	
	Use of standard colour descriptors	0
	Textile types named	12
	Designs described	5
	Consistent use of textile industry terminology	4
	Use of keywords and tagging to filter searches	11
9.	**Name institution(s) whose online catalogue you like using**	
10.	**What kind of information helps you assess whether an historical record might be relevant to your work?**	
	In-depth overview of the collection	13
	Detailed item-level description of each record	27
	Contextual information	24
	Physical information e.g. dimensions	24
	Thumbnail digital images	16
	Full-size digital images	28
	Other	8
12.	**Do you use digital copies of historical records in your research/practice?**	
	For most or all projects	12
	For some projects	21
	Never	2
13.	**How do you access or obtain these digital copies?**	
	I photograph historical records during onsite visits to archives, libraries and museums	23
	I order digital copies from the organisation holding the historical records	15
	I view/download digital copies from the archive/library/museum website	31
	I view/download digital copies from commercial databases	8
	I view/download digital copies from other websites	15
	Other	3
15.	**What purposes do you use these digital copies for?**	
	Planning a project	16
	To assess whether to go and look at the historical records in person	21
	To answer research questions	29
	For creative inspiration	10
	Other	6
17.	**Additional contribution**	

Appendix Two

Institutional case studies: master set of interview questions

1. Tell me about your role within [institution].

2. What would you say are [institution]'s aims in digitising collections?
   a. Are these set out in a policy document, or are they more informal?
   b. Are the digitised collections fulfilling these aims?

3. How does the institution decide which collections to digitise?
   a. Who contributes to that decision-making process?
   b. Are users consulted about the collections they would like digitised?

4. Does the institution seek feedback from users about their experience of using the digitised collections, or analyse online usage? To what extent does user feedback or analytics data inform future digitisation?

5. Is a standard digitisation specification used for all collections, or are specifications tailored for each collection/item?
   a. What factors influence this decision?

6. When you digitise records, or describe them in the catalogue. what level of priority is attached to documenting their material properties e.g. size, binding?

7. Has digitisation work provided an opportunity to revisit existing catalogue descriptions?

8. What are the constraints or challenges which impact what digitisation and/or cataloguing work you can deliver (e.g. capacity, skills, funding)?

9. The pandemic has had a huge impact on heritage institutions and society more widely. Has it changed how your institution views its digital activities? In what ways?

Appendix Three

University of Glasgow Ethics application

A) Research Ethics Checklist

	YES	NO
Does the research involve human participants?	☒	☐
Does the research involve 'personal data' as defined under GDPR?	☒	☐
Does the research involve 'special category personal data' as defined under GDPR?	☐	☒
Does the research involve data not in the public domain?	☒	☐
Are public domain outputs envisaged?	☒	☐
Does the study involve people in a dependent relationship, minors, or vulnerable people who may be unable to give informed consent?	☐	☒
Will the study require the co-operation of a gatekeeper for access to participants?	☐	☒
Does the project involve observation of participants?	☐	☒
Will it be necessary to conceal from participants the aims of the research at any point?	☐	☒
Will the study involve discussion of sensitive topics?	☐	☒
Could the study induce psychological stress or anxiety or cause harm or negative consequences beyond risks routinely encountered?	☐	☒
Are there issues of safety for the investigators or subjects?	☒	☐
Will financial inducements be offered to participants?	☐	☒
Are there issues of confidentiality?	☒	☐
Are there issues of security?	☐	☒
Are there issues of balance?	☐	☒

C) ETHICAL ISSUES: RISKS AND MITIGATION

C1. Non-Clinical Research Involving Human Subjects
1. Recruitment of participants Interview participants will be heritage professionals and other staff working in cultural heritage institutions and will be selected because of their role. The researcher (PhD student) will ideally work with one member of staff as the point of contact within the institution; that person can be responsible for identifying colleagues to participate and seeking their initial consent. Otherwise, the researcher will make direct contact with potential participants. All potential participants will be provided with a project information sheet and consent form in advance of the interview and asked for their explicit consent to participate. Interviews may be conducted in person, by telephone, online via Zoom or similar platforms, or by e-mail. Participants are free to decide to

withdraw from an arranged interview before it takes place, to terminate the interview or to decline to answer specific questions.

Participants in the online survey will be self-selecting and their participation will be voluntary. The survey questionnaire will be circulated using relevant channels, such as subject-specific online discussion forums and newsletters. It will be aimed at textile heritage researchers and creative practitioners who use textile collections in their practice. Project information and a consent form will be provided at the start of the questionnaire.

2. Recording interviews

With the explicit consent of participants, interviews may be recorded for the purpose of helping with note-taking. Recordings will not be retained beyond the end of the project (storage as below). Recordings will not be made without consent.

3. Personal data

Interview participants will be asked to provide their first name, surname, job role/title, place of work and work contact details (work e-mail and/or telephone number). This will be noted for the purposes of managing the interview data; contact details will not retained beyond the end of the project (in line with GDPR regulations).

Participants will be given three options regarding anonymity and attribution:

i) total anonymity (words paraphrased, a generic descriptor used)
ii) paraphrasing with full or partial attribution
iii) direct quotes with or without attribution.

Participants will be advised that the institutions involved in the project will be identified, so it may be difficult to guarantee total anonymity. If a participant is concerned about this, we will not proceed with the interview.

The University's instance of Office365 will be used to administer the survey. Survey participants will not have to provide any personal data to participate and can remain anonymous. A final question asks if they wish to supply their name and e-mail address because they are willing to be contacted for follow-up discussion, but this will be completely optional. If a participant chooses to provide their contact details, these will be stored separately from their questionnaire data, which will be anonymised.

Personal data will be securely stored on the researcher's university instance of OneDrive. Data will be backed up on either the University's J: drive or OwnCloud, depending on access to these storage areas. Only the researcher will have access to this data.

The researcher has completed the University's GDPR training, other Data Protection training and the University's Information Security and data management training. She also has extensive personal experience managing records containing sensitive personal data.

4. Copyright

The textile company collections used during this project will be in copyright. Copyright may belong to multiple parties. Copyright ownership will be checked with each

custodian institution and explicit permission sought for use of the records (including images of them, both those taken by the researcher and ones created by the institution) in the thesis, publications, online and other project outputs. Images will not be reproduced without permission.

Most of the documents studied for the document analysis will be in the public domain and will be retrieved from institutional websites. They will be copyright of the institution, or a named third party. Any documents supplied by an institution to the researcher, which were created for internal use only, will be in copyright. They may also contain information which is not in the public domain. Explicit permission will be sought to use, and quote from, such documents in the thesis, publications and other outputs.

5. Public domain outputs

Outputs envisaged:

PhD thesis
Article(s) in peer-review journal(s)
Conference activities e.g. presentations/posters
Social media content
Exhibition of archival records

Participants in the research will be asked for their explicit consent for their name, role and/or the data they provide to be included in the thesis and any publications. Permission will be obtained to use copyright materials in the project outputs.

The archival records used in the exhibition will be ones which are publicly available in the University of Glasgow Archive Service. They will not contain any personal data about living persons. Permission to use the records and copyright clearance for display and in publicity materials will be obtained from the custodian or other party as required. Members of the public viewing the exhibition may be invited to contribute a response to the exhibition by writing it on a piece of paper and posting it in a sealed box beside the display. This will be completely voluntary and contributors will not be asked to provide any personal data.

6. Participant safety

Participants interviewed in person will be interviewed at their place of work, during office hours, in a location of their choosing e.g. office, meeting room, public area of building. They are welcome to have a colleague present if they wish. Any Covid-related social contact rules in place at the time of the interviews will be observed.

Participants being interviewed using remote methods will be asked to provide their work, not personal, contact details (telephone number, e-mail address).

7. Lone working for researcher

Compiling the institutional profiles may involve onsite visits and face-to-face interviews with participants.

- All sites will be public/office buildings associated with an institution.

- Archives, libraries and museums are not usually located in areas considered high-risk in terms of personal safety, but advice will be sought from staff about any relevant issues.
- Site visits will take place during working hours; the researcher will probably be accompanied by a member of staff at all times in staff-only areas.
- The majority of participating institutions will be located in the UK. Some site visits may require an overnight stay.
- It is possible that one participating institution may be located in the USA. Most work with the institution will take place remotely but a site visit may be considered.
- Interviews will take place at the participating institutions during working hours. They will be conducted in the participants' workspace, a staff meeting area or public area, as chosen by each participant. If the location seems inappropriate or unsafe in the researcher's view, she will propose an alternative location.

8. Confidentiality

Interviews

Participants will be asked about institutional decision-making, policies, objectives and processes. They will not be asked personal questions or probed to reveal confidential information about their institution's activities. Participants may choose to express personal opinions about policies or practices which they do not wish made public - their wishes will be respected. Any information that is disclosed as confidential will not be published. Participants can decline to answer specific questions.

Survey

No issues with confidentiality are envisaged. Participants will be asked about the ways in which they use archival records in their research and their experience of searching online catalogues to find such records. Participants will not be asked questions of a confidential nature and can decline to answer specific questions.

C2. Research Involving Archival Materials/Artefacts

This project involves the use of archival records. These records will all be held in public archives. They are not sensitive in character and do not relate to living individuals or their close relatives. Records accessed in person will be held in public archives, principally in the UK, and any conditions of use will be checked with their custodians. Records accessed online will be in the public domain. These may be held by institutions outwith the UK. Licences associated with online collections will be checked to ensure that this project's use of them is in line with the licence.

Provenance: most, if not all, collections used in this project will have been created by UK businesses. With a few possible exceptions, the records will either have passed directly from their final business owners to the archive repository, or have been transferred via an official third party, such as a liquidator. In some cases, ownership has been transferred to the archival institution.

C3. Data Management and Research Outputs

Secure storage of data

Data will be securely stored on the researcher's university instance of OneDrive. Data will be backed up on either the University's J: drive or OwnCloud, depending on access to these storage areas. Only the researcher will have access to this data. The researcher's personal laptop is password-protected and is not used by anyone else.

Managing personal data

Participants' contact details will be stored securely on university data storage as above. The information will be destroyed at the end of the project. Contact information will be kept in a separate document. Only the researcher will have access to this data. Participant consent forms will be stored securely and retained for the duration stipulated in University regulations. A separate identifier record will be created to manage participant data, such as interview recordings and transcripts.

Research outputs

A subset of the research data will be saved in the University's Enlighten: Research Data repository and made available with an open access licence.

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Private collection, Caldwell, Young & Company, pattern book.
University of Glasgow ASC, Anderson & Robertson Ltd., UDG029.
University of Glasgow ASC, David & John Anderson Limited, UDG022.
University of Glasgow ASC, David Ligat & Sons Ltd., UGD093.
University of Glasgow ASC, House of Fraser, FRAS.
University of Glasgow ASC, James Findlay & Co., UGD091.
University of Glasgow ASC, Mitchell/Muter papers, Napier collection, DC90/7.
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Meetings and personal communications

Ames, S. (2022) Zoom meeting with author, 2 March.
Archive Digital Curator (2022) Zoom interview with author, 2 November.
Assistant Archivist: cataloguing (2022) Meeting with author, 25 October.
Breakell, S. (2024) Zoom meeting with author, 14 March.
Campbell, C. (2022) Zoom interview with author, 4 April.
Claypool, D. (2024) Zoom meeting with author, 18 July.
Digital Transition Manager (2022) Zoom interview with author, 1 March.
Digitisation team member (2019) Meeting with author, October.
Dyer, S. (2021) Meeting with author, 29 November.
Fullarton, I. (2021) Meeting with author, 29 November.
Green, J. (2021) Zoom meeting with author, 10 August.
Head of Archive and Library (2023) Zoom meeting with author, 1 June.
Kaye, M. (2023) Zoom meeting with author, 18 April.
Kilkki, J. (2014) Meeting with author, October.
McCann, S. (2021) Zoom interview with author, 2 December.
McClure, K. (2022) Meeting with author, 25 October.
MacLean, R. (2022) Interview with author, 5 April.
Moaby, R. (2022) Zoom interview with author, 21 September.
Museum curator (2022) Zoom meeting with author, 7 April.
NLS staff member (2022) Zoom interview with author, 4 April.
Phillips, C. (2023) Email to author, 28 July.
Pollard, C. (2022) Interview with author, 13 December.
Prescott, A. (2022) Zoom meeting with author, 19 January.
Prescott, A. (2024) Email to author, 2 September.

Quye, A. (2021) Zoom meeting with author, 12 April.
Senior Assistant Librarian (2021) Interview with author, 24 November.
Smith, V. (2022) Zoom interview with author, 15 March.
Southwark staff member (2022) Zoom interview with author, 29 June.
Tucker, J. (2021) Zoom meeting with author, 9 September.
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