COLLECTIONS AS NETWORKED IMAGES: THE (RE)USE OF THE SCIENCE MUSEUM GROUP COLLECTIONS IN THE FORM OF DIGITAL IMAGES THROUGH SOCIAL MEDIA

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The most shared image of an SMG collection object through Pinterest: Science Museum Group. Female ivory anatomical figure, Europe, undated. A642621Science Museum Group Collection Online. Accessed 30 March 2024. https://collection.sciencemuseumgroup.org.uk/objects/co77120/female-ivory-anatomical-figure-europe-undated-anatomical-figures.

Abstract

Science Museum Group (SMG) collections have been shared through social media as digital images. This thesis seeks to understand ***how*** the SMG collection is shared through social media, and whether the sharing of digital images of the SMG collection through social media is an act of heritage creation or the interpretation of heritage through sharing and recontextualising. Does this expand on or provide new understandings of the objects? In what form is the image being shared as a digital object? Building on the work of Andrew Dewdney and Katrina Sluis, collection images shared through social media are understood as 'networked images', in that they are the sum of their many linkages both technological and social. This digital humanities PhD uses qualitative, as well as computational methods and sources. Twitter and Pinterest are the social media platforms studied, and all data collection was undertaken before the COVID-19 pandemic. Images of encounters with the SMG collections, both physical encounters shared digitally and digital to digital sharing of collections, are in scope. The automation of context when collections are shared through social media and how digital infrastructures can facilitate the sharing of museum interpretation are explored. The digital object, or networked image, shared through social media is a vehicle for museum interpretation of collections as well as an opportunity for people to recontextualise the collections themselves.

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List of Abbreviations

ANT - actor network theory

ASR - automated speech recognition

CC - creative commons

CDP - collaborative doctoral partnership

CMS - collections management system

DAMS - digital asset management system

DH - Digital humanities

GLAM - galleries, libraries, archives and museums

MIAT - Museum in a Tab

NRM - National Railway Museum

SEO - search engine optimisation

SMG - Science Museum Group

SIM – Science and Industry Museum

ROG - Random Object Generator

TCAT - Twitter Capture and Analysis Toolset

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Chapter 1 - Introduction

This thesis seeks to understand how the Science Museum Group's (SMG) collections are shared through social media, and more specifically how they are shared as *digital images* through social media. Building on the idea of a digital image contained within a social media post as a networked image, this research seeks to understand how collection objects are recontextualized through this act of sharing. Does this expand on or provide new understandings of the objects? What types of images of collection objects are being shared? In what form is the image being shared as a digital object?

How the SMG collection came to exist, its themes and approach to the representation of science through material culture, how it is hosted both physically and digitally in seven sites across England, and the digital infrastructure that makes it accessible online are all introduced. A literature review builds primarily on three disciplines and bodies of literature: digital humanities, digital museum studies and design history. This interdisciplinary approach helps to situate digital image sharing through social media: firstly, in the context of knowledge construction in museums, then to illustrate how posting can be an act of meaning making. Social media has facilitated a sharing of authority within the museum sector, helping to better situate heritage as a site of co-production within academic literature. Before digital images are theoretically situated as collection copies, critically understanding them in relation to their collection object referent is necessary while maintaining their autonomy. Digital images are introduced as an accessible technology of reproduction, already widely used but under-researched in this context.

Digital images of the collection are defined as two types: in-gallery images taken by visitors to the museum and shared through social media; and collection photography images produced by the museum itself. Key definitions for this thesis also include social media affordances, recontextualisation and what is meant by a digitised collection object. These are further detailed below.

The two platforms of study – Twitter and Pinterest – are introduced, along with why they have been chosen and the rationale for the exclusion of other platforms from the study. Throughout, this thesis will refer to the platform now known as 'X' as Twitter because the purchasing and subsequent rebranding of Twitter took place after the period of data collection and processing, which is detailed in the 'Methods for digital ephemerality' section of Chapter 2.

Introduction to the Science Museum Group / One Collection

The Science Museum Group's (SMG) collection is the point of entry in this thesis to understanding how digital images of collection objects are shared online. The collection is an amalgamation of different museums and their collections with around 7.3 million objects.[1] The SMG was formed of seven sites at the time of writing, including five museums across England.[2] The Science Museum, London was named as such in 1885, and has its origins in

[1] 'Our Collection | Science Museum Group' <https://www.sciencemuseumgroup.org.uk/about-us/collection/> [accessed 21 June 2020].
[2] Museums: Science Museum, London; Science and Industry Museum, Manchester; National Railway Museum in York; Locomotion, County Durham; National Science and Media Museum, Bradford.
Collection facilities: Blythe House, London (no longer an SMG site); and National Collections Centre Museum, Swindon, Wiltshire.

The Great Exhibition of 1851 in South Kensington,[3] before officially becoming a separate entity from The Victoria and Albert Museum in 1909.[4] It further evolved and grew by absorbing other collections, including from 'the former Patent Museum, the Museum of Practical Geology, and from individual donors, as in the case of the Buckland Fish Collection.'[5] From the 1970s, the group began to form and to expand its presence, with the Railway Museum (now the National Railway Museum) in York joining in 1975,[6] followed by the National Museum of Photography, Film and Television (now the National Science and Media Museum) in Bradford in 1983.[7] In the same year, the Group ceased to be a government department.[8] Locomotion became part of the Group, a heritage site including historic buildings and railways, displaying locomotives and railway rolling stock from the collection; it opened in Shildon County Durham 2004. Then in 2011-12 the now Science and Industry Museum, then Museum of Science & Industry in Manchester (MOSI), joined the group.[9] The different museum sites are separate, however the collection is conceptualised as one entity across the Group and presented online through a single website,[10] and it is this unified collection that is the site of study here.

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[3] 'About Us | Science Museum Group' <https://www.sciencemuseumgroup.org.uk/about-us/> [accessed 20 June 2020].
[4] Lance Day, 'A Short History of the Science Museum', *Science Museum Review*, 1987, pp. 14–18 (p. 15).
[5] Sharon Macdonald, *Behind the Scenes at the Science Museum*, First Edition edition (Berg Publishers, 2002), p. 63.
[6] Day, p. 18.
[7] Shortly after this in 1980 the Fleet Air Arm Museum Yeovil Somerset was also part of the Group. A short history of the science museum. Day, p. 18.
[8] Day, p. 18.
[9] *ONE POWERFUL CULTURAL FORCE: Science Museum Group Annual Review 2011-2012* (Science Museum Group, December 2011), pp. 1–46 (p. 4) <https://www.sciencemuseumgroup.org.uk/sites/default/files/2023-11/smg-annual-review-2011-12-part-1.pdf> [accessed 1 March 2024].
[10] 'Science Museum Group Collection' <https://collection.sciencemuseumgroup.org.uk/> [accessed 15 March 2024].

The coming together of these museums, individually with their own accumulation of objects and records, has resulted in a Group collection that seeks to represent science through material culture, including objects relating to science, media, medicine, industry and transport. At the time of the primary digital data collection in 2019 the SMG did not yet include born-digital objects; it did include the material ephemera relating to digital objects, such as software carriers (e.g. disks) that have been incorporated into the collection to represent them.[11] However, born-digital collecting has begun with the work of Rees and Phillip Roberts,[12] and the acquisition of the 'absolute unit' meme at the NSMM that was approved in December 2020.[13] The shift in collections development policy in 2021 to incorporate 'digital-born' and 'hybrid' objects following this was noted by Rees.[14] Detailed discussion of the breadth and scale of the SMG collection is beyond the scope of this thesis.

The SMG's collections management system (Axiell's Mimsy XG) handles collection records,[15] and the collections online website is built on top of these. This approach has its legacy in the museological or analytical science of the late 19th century.[16] The Group describes itself as '[t]he

[11] There is work being done to collect digital artefacts. Arran Rees, 'Memes Should Be Archived in a Museum' <https://ahc.leeds.ac.uk/fine-art/news/article/1516/memes-should-be-archived-in-a-museum> [accessed 21 June 2020]; Currently material ephemera has also been incorporated into the SMG collection to represent born digital items such as software. 'Apple "Hypercard" Software, 1987', *Science Museum Group Collection* <https://collection.sciencemuseumgroup.org.uk/objects/co8399490/apple-hypercard-software-1987-software> [accessed 21 June 2020].
[12] Then Associate Curator of Photography and Photographic Technology at NSMM.
[13] Arran Rees, 'Remixing Museology: An Approach to Collecting Social Media in Museums' (unpublished degree of Doctor of Philosophy, The University of Leeds, 2021), p. 192.
[14] Science Museum Group, *Science Museum Group Collection Development Policy 2021* (Science Museum Group, January 2021), pp. 1–22 (sec. 1.3) <https://www.sciencemuseumgroup.org.uk/sites/default/files/2023-11/smg-collection-development-policy-2021.pdf>; Arran Rees, 'Remixing Museology: An Approach to Collecting Social Media in Museums', p. 192.
[15] 'Mimsy XG', *Axiell* <https://www.axiell.com/solutions/product/mimsy-xg/> [accessed 15 March 2024].
[16] Macdonald, p. 64.

world's most extensive online collection of science, technology, engineering and medicine'.[17] The collection website in its current form was launched in 2017[18] (a 'beta' version, which launched in December 2016, ran in parallel with the old collection website for several months). Its web address (domain name) was later changed to reflect the united group collection in 2019.[19] Although not exclusively,[20] many of the digital images shared were digitised by the Group.

This research was undertaken at the time of the 'One Collection' Project. As established, the SMG conceptualises its collection as one. The 'One Collection' project, however, was a separate initiative within SMG that aimed to further unify the collection. In part this was prompted by the need for the Science Museum Group collections to move out of the government-owned Blythe House collections storage facility and into a specially built collection store (Building One) at the former RAF airfield in Wroughton, which is set to become the National Collections Centre in Wiltshire by 2023.[21] Building One was built during the writing of this thesis. Furthermore, the move was a large logistical undertaking. This transfer of the collection was capitalised upon by SMG as a chance to photograph their stored

[17] 'Revealing the Science Museum Group Collection', *Science Museum Group* <https://www.sciencemuseumgroup.org.uk/project/collection/> [accessed 20 June 2020].
[18] Jessica Bradford, *Collections Engagement Strategy* (Science Museum Group, February 2019), pp. 1–18 (p. 9); 'https://collection.sciencemuseum.org.uk/', *Wayback Machine* <https://web.archive.org/web/20190801000000*/https://collection.sciencemuseum.org.uk/> [accessed 20 June 2020].
[19] SMG collections URL went from http://collection.sciencemuseum.org.uk/; then became https://collection.sciencemuseum.org.uk/; before becoming https://collection.sciencemuseumgroup.org.uk/.
[20] There are multiple official sources of SMG digital image content including *Science & Society Picture Library* and *Brought to Life*. This is discussed further in Chapter 3.
[21] Adrian Murphy, 'One Collection: The Future of the Science Museum Group's Storage and Archive Facilities', *Museums + Heritage Advisor* <https://advisor.museumsandheritage.com/features/one-collection-future-science-museums-storage-archives/> [accessed 20 June 2020].

collection and expand their online collection through improved collection records.

Transferring and photographing the collection has meant that there are an increased number of online collection records with digital images. This enables greater potential to share the collection through digital images. This mass digitisation project is the research context in which this thesis is situated. The project included a specialist team working at Blythe House to 'study, record, digitise, pack and transport over 300,000 objects'.[22] The transfer of the objects at Blythe House and associated digitisation has resulted in thousands of objects being photographed and published.[23] Notable online collection expansions and redesigns have often been possible in part because of changes to the physical building of the museum or collections storage.[24] The ambition with the 'One Collection' project mass digitisation was to add 300,000 more images to the online collection between 2018 and 2023.[25] The primary research for this thesis was undertaken during the digitisation phase, which saw a rapid increase in digital images of the collection becoming available online. Indeed, 50,000 additional images were added by June 2019.[26] When feasible, the pandemic was used as a time to digitise large parts of the collection, meaning that over 150,000 objects had collection object images, a 5% increase from 2018.[27] However, a substantial part of this expansion in the online collection happened after the period of primary data collection for this

[22] 'Revealing the Science Museum Group Collection'.
[23] 'Revealing the Science Museum Group Collection'.
[24] Rhiannon Lewis, '"Digital Surrogates": Historically Locating and Understanding the Evolution of Digitized Collection Objects in the Victoria and Albert Museum 1996-2018' (Royal College of Art, 2018), pp. 54–83.
[25] Bradford, p. 9.
[26] 'Say Cheese! | Science Museum Group' <https://www.sciencemuseumgroup.org.uk/blog/say-cheese/> [accessed 29 June 2020].
[27] Will Dave, 'Picture It: Marking a Milestone for Our Collection', *Science Museum Group Blog*, 2022 <https://blog.sciencemuseumgroup.org.uk/150000-objects-with-an-image-online/> [accessed 15 March 2024].

research, and this expansion of digital images is therefore not reflected in findings here. Although the influx of newly digitised collection images does not necessarily result in them being shared through social media, this expansion is important context for understanding collection sharing.

This thesis was undertaken as part of a collaborative doctoral partnership, which meant that the researcher was embedded within SMG. This context enabled them to have access to resources and records, as well as staff time and expertise, and to attend staff meetings and interview staff members.[28] The focus of the research was across the five museums in the Group, but the author was physically located in the Science Museum in London and sat with the Group's digital team based there. In addition to being based within the SMG as part of the PhD, the author also worked as part-time research co-ordinator for the Heritage Connector project.[29] This context of being based within SMG, and more specifically within the digital team in the Science Museum London, has informed the shape and development of the thesis.

Literature review

The introductory literature review presents key concepts that underpin the thesis as a whole, however the literature review for this thesis is spread throughout its chapters. It begins here with construction of knowledge by museums, followed by a shift to shared authority of meaning making by social media and content sharing practices. Existing approaches to heritage interpretation and how it intersects with social media study are explored.

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[28] This is detailed later in research design and forms part of the methodology in chapter 2.
[29] 'Heritage Connector: Transforming Text into Data to Extract Meaning and Make Connections', *Science Museum Group* <https://www.sciencemuseumgroup.org.uk/project/heritage-connector/> [accessed 21 June 2020].

Collection objects and their copies are then discussed; what makes a collection copy and how these may or may not differ from digital surrogates of objects. The digital image is then presented as a technology of use, and how this has added to its accessibility and invisibility is explored. Finally, the 'networked image' a key idea that underpins this thesis, is introduced in through secondary literature.

This is not the sole literature review; a series of smaller literature reviews begin each chapter. These have been positioned to provide a specific framing for the analysis undertaken in each chapter. In chapter two ethical principals for producing digital humanities research are presented in *Introduction to methods*. *The practice of sharing images in literature* in chapter three sets out the existing literature around sharing on social media as a space for performance and as a memory keeping tool. Context collapse and social media as a space of consumption as well as production are also discussed in chapter three. In chapter four the *Collection photography* section discusses how museum photography has been defined in existing literature, its production and recognisable aesthetic are discussed. Finally, the *Existing discussion* literature review in chapter five looks at collections data and gives an in depth introduction to object biography and actor network theory, as theoretical tools used to understand how context has been automated (these are also briefly introduced below).

Knowledge construction in museums

People's relationship to accessing knowledge, categorising it and understanding it has been fundamentally changed by the internet. Changing structures of knowledge is not a new concept, however our ability to participate in its construction has been changed by internet access. 'The truth' and construction of information by museums has changed over time,

Eileen Hooper-Greenhill's *Museums and the Shaping of knowledge* gives an introduction into changing framings of truth over time. Museums have been active shapers of knowledge for over six hundred years, therefore the construction of knowledge in the museum is not a static concept, nor is its inevitable change a new idea.[30] Museums have facilitated different ways of knowing based on context.[31] Writing in the early 1990s, Hooper-Greenhill noted that 'Knowledge is now well understood as the commodity that museums offer.'[32] They are stores of knowledge as well as objects.[33]

Knowledge construction in the museum is achieved, in part, through the creation and maintenance of a collection. Hooper-Greenhill introduces this idea:

> Collections are brought together and used to make visual statements by purposeful individuals, acting on the basis of sets of ideas, attitudes and beliefs. These cognitive and emotional structures give shape and meaning to the objects. Relations of gender, ethnicity and class become embedded within structures of collections; attitudes to 'other' inform perceptions of the 'self'.[34]

Collection objects are participating in a construction of a particular type of knowledge, and this has to be taken into account to better understand their recontextualisation through social media. In subsequent research, Hooper-Greenhill expanded on this idea, particularly in her work on visual cultural theory as a lens through which to understand the construction of visual knowledge in the museum.

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[30] Eilean Hooper-Greenhill, *Museums and the Shaping of Knowledge*, 1 edition (Routledge, 1992), p. 191.
[31] Hooper-Greenhill, *Museums and the Shaping of Knowledge*, p. 191.
[32] Hooper-Greenhill, *Museums and the Shaping of Knowledge*, p. 2.
[33] Quoting Canon-Brookes. Hooper-Greenhill, *Museums and the Shaping of Knowledge*, p. 4.
[34] Eilean Hooper-Greenhill, *Museums and the Interpretation of Visual Culture / Eilean Hooper-Greenhill.*, Museum Meanings, 4 (Routledge, 2000), p. 9.

> The constructions of meaning in the museum are based on visual interpretations, which are differentiated according to the social discourses within which these interpretations are placed. Treating museums as visual discourses enables the questioning of the relationships between looking, knowledge and power.[35]

Through incorporating this visual construction of meaning, in addition to collection as meaning making, it is possible to better understand digital images of the collections that are produced by the museum and then shared through social media. What does it mean when the collection as a constructed body of knowledge is shared in the context of social media, encountered as individual objects without the collection or the museum as a setting?

An object has the potential to be a conduit for multiple meanings. Individual objects in any museum collection will not have only one meaning when the objects are considered individually.

> Individual objects have shifting and ambiguous relationships to meaning. Being themselves mute, their significance is open to interpretation. They may be viewed from a number of positions, which may be diverse in history and culture. They may be drawn into conversations through a number of different strategies, by a range of different individual subjects, who talk about them in ways that are meaningful to themselves as speakers. They may be understood through factual information, or may be invested with emotional significance. Although they all have life-histories, these may be well-known or, alternatively, unknown or forgotten. Objects are subject to multiple interpretations, some of which may be contradictory.[36]

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[35] Hooper-Greenhill, *Museums and the Interpretation of Visual Culture / Eilean Hooper-Greenhill.*, p. 15.
[36] Hooper-Greenhill, *Museums and the Interpretation of Visual Culture / Eilean Hooper-Greenhill.*, p. 3.

Articulated here is the possibility for a single object to have a plurality of meanings, making room for museum interpretation to reflect this. Sharing through social media can also allow for exploration of multiple interpretations of the same object.

Understanding objects as having had their own life history and biography is a point of exploration into the many contexts and uses that a museum collection object may have had. Object biography is an established idea in anthropology, museum studies and design history. It is the idea, coined by Igor Kopytoff in the 1980s, that objects like people have their own biographies. It has encouraged material culture scholars to map an object's trajectory,[37] to have considered its history and context.[38] There has been some criticism of the theory. In *The Brutish Museum,* for example, Dan Hicks writes that is a tool that maintains colonial inequality,[39] and instead proposes use of the term 'Necrography.'[40] Object biographies are understood in this thesis as resembling life histories and therefore not fixed. The reasons for accession into a museum collection and subsequent interpretation intersect with object biographies: 'You cannot say everything about an object [...] objects have long biographies but you will have selected an object to tell a particular story, so you must use the limited space available to explain how the object relates to this particular theme.'[41] The object's biography told by the museum in its collection item interpretation can be limited by space,[42] or to the reason that the museum collected and accessioned it. How object biographies have been used as a

[37] Leonie Hannan and Sarah Longair, *History through Material Culture* (Manchester University Press, 2017), p. 24.
[38] Hannan and Longair, p. 57.
[39] Dan Hicks, *The Brutish Museums: The Benin Bronzes, Colonial Violence and Cultural Restitution* (Pluto Press, 2021), p. 26.
[40] Hicks, p. 33.
[41] Hannan and Longair, p. 149.
[42] Word count in a collections management system field or on a label.

lens through which to understand museum interpretation of objects and digital copies is discussed in more detail in Chapter five.

Context is essential for the interpretation of objects, but they remain open to personal recontextualisation. Hooper-Greenhill's arguments and conclusions are built on the work of Michel Foucault, who argued that reason and truth are relative to 'historical, social, and cultural context.'[43] Foucault's focus on processes in the construction of knowledge, when applied to museums, helps to articulate individual interpretations, in comparison to museum processes of meaning making (i.e. exhibitions). Hooper-Greenhill hints that this broadened understanding of the construction of knowledge could mean personal interpretations of objects when standing apart from the museum context.[44] This proposition is revisited in this thesis, which considers how museum practice might be changed and shaped by social media.

Sharing (authority)

Making and sharing personal meaning through objects on social media is an important means of engagement with museums, and a focus of this thesis. Budge and Burness, in *Museum objects and Instagram: agency and communication in digital engagement*, sought to understand engagement with museum objects through Instagram and personal "meaning making" through sharing museum objects on social media platforms. Budge again explored social media posts as outcomes of material appreciation, specifically locating herself within an 'emergent but important field in which much can be learned about meaning-making embedded within particular

[43] Hooper-Greenhill, *Museums and the Shaping of Knowledge*, p. 9.
[44] Hooper-Greenhill, *Museums and the Shaping of Knowledge*, p. 215.

experiences.'[45] Object interpretation, and/or recontextualisation, can be in response to circumstance as well as to the museum collection object.

Here, meaning making is happening not as a consequence of museum instigated programmes (e.g. crowdsourcing), but rather through an ongoing personal interpretation through social media channels. Engagement through appropriation of content (collections) is articulated by Murphy and used in her writings on participatory practice within museums: 'While it is right for museums to uphold accuracy as the cornerstone of museum practice, the emergence of visitor appropriation of collections is becoming endemic'.[46] This observation builds on the everyday nature of these social media posts and their role as a self-directed way of interpreting and sharing museum collections:

> Increasingly, participation is becoming self-directed, with visitor-generated participatory practices existing in parallel to facilitated participatory opportunities offered by an institution. For some visitors, this means a quick snap on their phone, the addition of a funny comment, a physical response such as copying the pose in a painting, or editing a work of art using digital filters or text overlay, while for other visitors participation can be more sophisticated, longer-term, and strategic, from dedicated blogs to websites and apps.[47]

Self-directed sharing of museum objects and collections takes place through the affordances of different social media platforms. Murphy stipulates that this is part of an 'open-ended invitation to participate'[48]

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[45] Kylie Budge, 'Objects in Focus: Museum Visitors and Instagram', *CURATOR - THE MUSEUM JOURNAL*, 60.1 (2017), pp. 67–85 (p. 82).
[46] Oonagh Murphy, 'Museum Studies as Critical Praxis: Developing an Active Approach to Teaching, Research and Practice', *Tate Papers*, Spring 2018.29 (2018), para. 26 <https://www.tate.org.uk/research/publications/tate-papers/29/museum-studies-critical-praxis> [accessed 12 September 2019].
[47] Oonagh Murphy, 'Rethinking Participatory Practice in a Web 2.0 World', in *MUSEUM PARTICIPATION* (MuseumsEtc, 2016), pp. 104–29 (p. 118).
[48] Oonagh Murphy, 'Rethinking Participatory Practice in a Web 2.0 World', p. 109.

fostered by museums**.** Self-directed meaning making that is not incorporated into or sanctioned by museum programming, as a spontaneous reaction to museums and museum objects, should be studied. In this context self-directed meaning making can be understood as participation.

Self-instigated engagement with museum objects, or 'visitor appropriation' of the collections,[49] should be observed by museums as a way of understanding their collections outside their own programming. The shift from passive to active visitor was introduced as a concept by Hooper-Greenhill, and we now see it represented in visitor as creator, and museum as observer. This paradigm shift in participation has been postulated by several academics. Murphy, quoting Gauntlett in *Making is connecting – The social meaning of creativity, from DIY and knitting to YouTube and Web 2.0*. 2011, cites "the knowledge that they can be creators, and not just receivers, of inventive media" has transformed visitor behaviour.[50] How does the museum go about understanding this engagement through visitor appropriation and re-contextualisation of its collections? 'It is a shift in which cultural institutions, if attentive and willing, can gain by observing and "listening to" their audiences through studying engagement with the museum experience represented through the sharing of images and text on social media.'[51] Budge makes a call to action for museums to be more attentive to what parts of their collections visitors are sharing through social media, and this is something that this thesis seeks to address.[52] Writing from a museum and business studies background, Villaespesa proposes a scorecard through which to understand museums' success through social

[49] Oonagh Murphy, 'Rethinking Participatory Practice in a Web 2.0 World', p. 123.
[50] Oonagh Murphy, 'Rethinking Participatory Practice in a Web 2.0 World', p. 125.
[51] Budge, p. 82.
[52] Budge, p. 67.

media.[53] Importantly for this thesis, it is concerned not just with output produced directly by the institution, but also with understanding how the museum's content is interpreted by audiences. This attentive listening to self-directed user-generated content, or visitor appropriation of collections, is the starting point for this thesis.

With the user no longer passive online, web 2.0 has also meant that they move from being a passive receiver of content to a contributor.[54] The primary research for this thesis was not undertaken at a time when social media was labelled "web 2.0", however texts on the affordances introduced by web 2.0 platforms aid in understanding participation in online spaces. *Discourse in the Blogosphere* by Nina Simon suggests that '[i]n all these cases, the experience with the content is informed and refined by other users' submissions and judgments.'[55] This perfectly articulates the tensions between the museum and web 2.0 practices.

There are theories that have sought to describe and provide a framework for the participatory shift in museums. Nina Simon's book on *The Participatory Museum*, although seemingly written for museum professional practice, has been widely cited by academics writing critically about visitor participation in museum programming. There are three concepts underpinning the 'Participatory Museum': that the social museum should be audience-centred and accessible; that the audience constructs their

[53] Elena Villaespesa Cantalapiedra, 'Measuring Social Media Success: The Value of the Balanced Scorecard as a Tool for Evaluation and Strategic Management in Museums' (unpublished Thesis, School of Museum Studies, 2016) <https://lra.le.ac.uk/handle/2381/37985> [accessed 13 August 2019].
[54] Nina Simon, 'Discourse in the Blogosphere: What Museums Can Learn from Web 2.0', *Museums & Social Issues*, 2.2 (2007), pp. 257–74, doi:10.1179/msi.2007.2.2.257.
[55] Simon, 'Discourse in the Blogosphere', p. 258.

own meaning(s); and finally, that the 'voices' of the audience inform programming.[56]

Content is the starting point for the conversations that are created and instigated by users of the museum. Simon's conceptualisation of participation, or the culture of participation in a museum, is that connection, creation and sharing should happen around and in response to museum content.[57] This focus on content, rather than on the institution, gives a flexibility which positions the social museum not as happening within the museum walls or as a result of museum programming (although it can take place in this way) but rather as a result of conversations around museum content. Her work generally seeks to encourage the museum as a space for civic discourse.[58] This research considers the collections of the SMG shared organically through social media channels, enabling further interrogation of these ideas.

The focus on content is also key to unpicking museums' changed relationship with authorship in the 'Participatory Museum'. Simon was writing for an audience of museum professionals, and her work is a practical guide for museums wanting to work in a participatory way.

> One of the primary fears museum professionals (and all professionals) have about entering new relationships with audiences is the fear of losing control. However, in most cultural institutions, the professional expertise of the staff—to preserve objects, to design exhibits, to deliver programs—is not based on content control. It's based on expert creation and delivery of experiences. Expertise is valuable, even in a

[56] Nina Simon, *The Participatory Museum* (Museum 2.0, 2010), p. ii.
[57] Simon, *The Participatory Museum*, p. iii.
[58] Simon, 'Discourse in the Blogosphere'; Nina Simon and Jon Moscone, *The Art of Relevance* (Museum 2.0, 2016).

> platform-based institution. The problem arises when expertise creates a feeling of entitlement to control the entire visitor experience.[59]

This understanding and problematising of workflows of content delivery within museums, although not the focus of this thesis, helps to frame why museums might have been so hesitant to relinquish complete control over how their collections are experienced.

The shift in museums as the exclusive keepers of knowledge, for many reasons, is presented as particularly relevant when museum collections exist outside the museum walls. Cameron and Kenderdine, in their edited book *Theorizing Digital Cultural Heritage*, frame their critical discussion of digital media in cultural heritage by citing this legacy, and the position of the museum as authoritative 'custodian of the past',[60] therefore holding 'intellectual capital' in digital spaces. Although Cameron and Kenderdine suggest a previous position of museums as exclusive guardians of western societies' intellectual capital, they now situate museums within a new moment, with the digital acting as a catalyst for change: 'Digital technologies are implicated with historical transformations in language, society, and culture, and with shifting definitions of the museum.'[61] Technology hastens far-reaching change within society. It has a twofold effect, not only affecting society but the institutions that seek to represent that society (or an aspect of it).

The museum asserts or is recognised by its authority in a number of ways, including the 'unassailable voice'[62] or through defining its collections

[59] Simon, *The Participatory Museum*, p. 121.
[60] Fiona Cameron and others, *Theorizing Digital Cultural Heritage: A Critical Discourse* (MIT Press, 2010), p. 1.
[61] Cameron and others, p. 3.
[62] Peter Walsh, 'The Web and the Unassailable Voice', in *Museums in a Digital Age* (Routledge, 2010), pp. 229–36.

as a whole.[63] The process of naming, describing and framing objects, reflected in workflows and object representation, becomes the ultimate authority. In her 2022 book *Cataloguing Culture: Legacies of Colonialism in Museum Documentation* Hannah Turner investigates the construction of history and knowledge through documentation technologies in museums. Her work is discussed further in Chapter 5, specifically in the section: Mechanisms of onward journeys / connection to SMG. The ways in which museum knowledge construction are challenged by social media and digital culture are an important focus for this research.

'Institutional authority' manifests through collection representation and therefore collection representation online. The role of the museum as the keeper of society's culture and knowledge is manifested in the delivery and presentation of collections, as articulated by Peter Walsh.[64]

> [There] is a tone and attitude that pervades museum labels, brochures, exhibitions, catalogues, the guided tour, audio-visual presentations, and now websites. For the most part, it is both impersonal and disembodied: it is usually not a true human voice, connected to a real identity or personality, but a bureaucratic composite, in some ways closer to an IRS form than a living artist.[65]

The 'unassailable voice' is potentially an articulation of the past. However, it needs to be understood in order to contextualise user-generated content as a way of representing collections. Attempting to describe something intangible, Walsh presents the 'unassailable voice' as pervasive in museum content representation and output. He suggests that this is not a positive thing for audiences as it makes them feel ignorant. The web and the

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[63] Jenny Kidd, *Museums in the New Mediascape: Transmedia, Participation, Ethics / Jenny Kidd, Cardiff University, UK.* (Ashgate, 2014, 2014).
[64] 'Archives & Museum Informatics: MW99 - Author' <https://www.museumsandtheweb.com/mw99/bios/au_3882.html> [accessed 13 September 2019].
[65] Walsh, p. 229.

unassailable voice are at odds by their nature,[66] with the latter being disrupted by the social museum. This thesis will explore whether the unassailable voice is getting shared with the digital images, as interpretive text, metadata or text descriptions, to understand why those outside the museum would want to frame the digital image in this way.

Inclusion of 'outside' voices in the museum while maintaining its authoritative status has been described as a paradox. Pulh and Mencarelli undertook a survey of different levels of user participation, or indeed, how much visitor participation is allowed on European and North American museum-owned platforms. They were trying to describe maintaining museum authority and branding whilst embracing '[p]aradoxical tensions in the relationship with the visitor.'[67] This work leans on Simon's Participatory Museum theory to suggest tension between content generation and hosting through 'participatory logic', and content publication so as to control the museum brand in digital spaces.[68] Not all who write about individuals' responses to museums see them as a threat to the institution, but rather as a change. Museum Studies academic Ross Parry introduces the idea of 'The Personal Museum', in *Recoding the Museum*, as 'a place where authorship and authority could be shared rather than made the preserve of the curator alone'.[69] Understanding individuals' responses to collection objects and why they have shared images will be key to this research.

Participation and the opening up of narrative are also considered by some as a threat to credibility, authority and legitimacy. Pulh and

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[66] Walsh, p. 230.
[67] Mathilde Pulh and Rémi Mencarelli, 'Web 2.0: Is the Museum-Visitor Relationship Being Redefined?', p. 20 (p. 3).
[68] Pulh and Mencarelli, p. 6.
[69] Ross Parry, *Recoding the Museum: Digital Heritage and the Technologies of Change* (Routledge, 2007); Villaespesa Cantalapiedra.

Mencarelli, who approached the redefinition of the museum–visitor relationship triggered by web 2.0 technology from a cultural marketing perspective, were sceptical about the incorporation of visitor voices, and suggested that they could be a threat to the museum's authoritative voice, reputation and expertise.[70] They suggested that abandoning the position of authority would undermine museums' legitimacy and expertise,[71] '[t]hat expertise largely underpins the museum's legitimacy, which is defined historically as the "institutional figure of showing" (Deloche, 2001) and its traditional distancing of itself in its relationship with visitors.'[72] This thesis asserts, this is more about perception of the museum and museum brand than participation, but there is a tension between museum authority and expertise and its relationship to visitors. Does allowing more visitor participation challenge museums' legitimacy as they suggest? What about when these interpretations of collections happen away from museum-owned platforms without any guidance or intervention from the museum - when people are not being watched or guided or influenced by the spaces of the museum? How will this affect their interpretations?

There is work that presents an alternative to museums' upholding their role as authoritative institutions, whilst also embracing technology. This is a position not necessarily born of the digital turn, but employed by theorists commenting on museums to provide a theoretical basis for the articulation of challenges that occur as a result of the technological shift and the impacts these are having on museum practices. Indeed, Arvanitis employs Hooper-Greenhill's concept of the 'post-museum' (2000) to locate his ideas on mobile phone use:

> Move away from the modernist museum of the nineteenth century, which was imagined mainly as a building transmitting authoritative

[70] Pulh and Mencarelli, p. 12.
[71] Pulh and Mencarelli, p. 12.
[72] Pulh and Mencarelli, p. 12.

> factual information through the means of exhibition, and experience the emerging of a new museum model, the post-museum.[73]

Long before social media, Hooper-Greenhill articulated that the creation of knowledge puts curators in a position of power, but citing Fewster (1990), notes curatorial practice had shifted to fostering multiple interpretations, a 'plurality of histories'.[74] We can then see the progression to fostering a plurality of interpretations in Nancy Proctor's writing on the museum as a platform, where we see the curator described as a broker of knowledge.[75]

Heritage co-interpretation

Social media posts containing the SMG collection contribute to heritage. Is the sharing of digital images of the collection through social media an act of heritage creation or the interpretation of heritage through sharing and recontextualising? Kidd's assertion that it is necessary to establish goals for participation to be effective perhaps needs to outline whether audience-initiated social media posts that reframe the collection are generating heritage in the form of new perspectives or whether they are challenging the authorial knowledge of the institution.

Social media can be a space where heritage interpretation is co-produced through responses. The work of Bonacchi and Rees demonstrates how social media content posting and processes that responded to heritage

[73] Konstantinos Arvanitis, 'Museum Outside Walls: Mobile Phones and the Museum in the Everyday', in *Museums in a Digital Age* (Routledge, 2010), pp. 170–77 (p. 171).
[74] Hooper-Greenhill, *Museums and the Shaping of Knowledge*, p. 8.
[75] Nancy Proctor, 'Digital: Museum as Platform, Curator as Champion, in the Age of Social Media', *Curator: The Museum Journal*, 53.1 (2010), pp. 35–43 (p. 35), doi:10.1111/j.2151-6952.2009.00006.x.

will themselves become heritage.[76] In the creation of exhibits, Luigina Ciolfi suggests social media can mean that exhibits become a site of heritage co-interpretation, which would ordinarily be created and maintained by skilled professionals. Social media platforms provide an accessible place to debate museum 'content and layout'.[77] Social media is a tool which facilitates the co-creation or interpretation of heritage, resulting in the shift from passive to active museum visitor expressed by Hooper-Greenhill. There is no longer a simple one-way transmission of knowledge.[78] Ciolfi is presenting an art-and-design-based example, but nevertheless offers a useful framing of possibilities. Social media affords the possibility of a heritage interpretation space for non-GLAM professionals.

Social media has the potential to act as a democratising technology for museum practice, but that may not be the reality of its use. Kidd is sceptical about blanket claims that social media has caused a paradigm shift in participation and representation.[79] Writing from a media studies background, she is able to reflect over a longer timeline of 'user generated content', specifically considering its impact on news media. Kidd framed these new developments as happening at the beginning of a shift for museums, and much like Ridge she suggested that, '[W]e must be careful not to overplay their significance at this time.'[80] The technology had the potential to be transformative, but shared authority in the interpretation of museum collections is new, and needs further study.

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[76] Chiara Bonacchi and Marta Krzyzanska, 'Digital Heritage Research Re-Theorised: Ontologies and Epistemologies in a World of Big Data', *International Journal of Heritage Studies*, 25.12 (2019), pp. 1235–47, doi:10.1080/13527258.2019.1578989; Arran Rees, 'Remixing Museology: An Approach to Collecting Social Media in Museums', pp. 187–210.
[77] Luigina Ciolfi, 'Social Traces: Participation and the Creation of Shared Heritage', in *Heritage and Social Media* (Routledge, 2012), pp. 56–86 (p. 71).
[78] Ciolfi, p. 73.
[79] Kidd, p. 5.
[80] Kidd, p. 5.

Crowdsourcing as the reason for the instigation of shared content does not form the primary data of this thesis. Crowdsourcing is a 'sourcing model where collective labour of participants is drawn upon for a specific outcome.'[81] However, the literature relating to crowdsourcing provides insight into framing labour and input from the crowd. Participation has been detailed and framed as something that does not have to be instigated by the museum.[82] This is a marked shift from crowdsourcing as a means to contribute to something predetermined. Some scholars have written about the production of history through crowdsourcing practices.[83] The activities that crowdsourcing can facilitate when hosted by heritage organisations or in relation to heritage collections fall broadly into two categories: content creation through crowdsourced digitisation;[84] and curation of content through digitisation.[85] Participation positioned as a voluntary act does not exclude it from also being transactional. Participation in Kidd's positioning of it, in *Museums in the new Mediascape: Transmedia, participation and ethics*, is conceptualised as the non-monetary transactional currency of time and/or resources, as part of the gift economy. She stresses that

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[81] Rhiannon Lewis, *Digital Humanities and Science Museum Group: A Landscape Study* (2022), p. 21.
[82] Oonagh Murphy, 'Museum Studies as Critical Praxis: Developing an Active Approach to Teaching, Research and Practice'; Elena Villaespesa and Sara Wowkowych, 'Ephemeral Storytelling With Social Media: Snapchat and Instagram Stories at the Brooklyn Museum', *Social Media + Society*, 2020, doi:10.1177/2056305119898776; Kylie Budge and Alli Burness, 'Museum Objects and Instagram: Agency and Communication in Digital Engagement', *Continuum*, 32.2 (2018), pp. 137–50, doi:10.1080/10304312.2017.1337079.
[83] Richard Coyne, 'Mosaics and Multiples: Online Digital Photography and the Framing of Heritage', in *Heritage and Social Media: Understanding Heritage in a Participatory Culture* (Routledge, 2012), pp. 161–78; Simon, *The Participatory Museum*; Chern Li Liew, 'Participatory Cultural Heritage: A Tale of Two Institutions' Use of Social Media', *D-Lib Magazine*, 20.3/4 (2014), doi:10.1045/march2014-liew.
[84] Shelly Bernstein, 'Crowdsourcing in Brooklyn', in *Crowdsourcing Our Cultural Heritage* (Ashgate, 2014), pp. 17–43; Liew.
[85] Mia Ridge, *Crowdsourcing Our Cultural Heritage*, ed. by Mia Ridge (Ashgate, 2014) <https://www.routledge.com/products/9781472410221> [accessed 5 August 2019]; Bernstein; Trevor Owens, 'Making Crowdsourcing Compatible with the Missions and Values of Cultural Heritage Organisations', in *Crowdsourcing Our Cultural Heritage* (Ashgate, 2014), pp. 269–81; Simon, *The Participatory Museum*.

organisational and interpretative frames of participation need to match up if participation through user-generated content is to be understood.[86] Kidd ponders whether 'moments of micro creativity collectively indicate the possibility for more active and vibrant democratic participation?'[87] Participation in the generation of content online, although transactional, can also be a personal and creative contribution. These motivations are significant for this thesis because understanding them aids in interpreting platform choice through recontextualisation.

There has been speculation about frameworks that can facilitate positive change that empowers both museums and visitors. A framework for 'open authority' is put forward by Lori Byrd Phillips that does not detract from the museum as a centre for knowledge whilst giving a platform to diverse perspectives could be a workable approach. Phillips argues for a new model of open authority arising from the collaborative web, from the angle of interpreting heritage. Rather than simply describing or critiquing the authority of museums, she suggests a framework for approaching the changed relationship, with authority sparked by more collaborative media:

> Museums can embrace the open web - a set of philosophies that include transparency, decentralisation, open-source code, open technical standards and two-way communication - as a model to reconcile traditional notions of authority with the expectations of the digital era, using institutional expertise to facilitate and validate this new, user-generated content. This model, which I call 'open authority' is the coming together of institutional expertise with the experiences and insights of our communities, both online and on-site. The concept of open authority is an effort to demystify and reconcile the seemingly contradictory ideas of open collaboration and museum expertise, making it clear that openness and authority aren't mutually exclusive. It

[86] Kidd, p. 61.
[87] Kidd, p. 69.

> is not about giving up anything - it is about fostering an open dialogue so that institutional expertise can be made even better, together.[88]

Using philosophies of open web practice, it is possible to suggest a model where insight and context from multiple parts of the community are in dialogue. Byrd Phillips constructs a metaphor: '[b]y combining the metaphors of "temple and forum" and "cathedral and bazaar", we can take advantage of the strengths of the collaborative web and move beyond the museum's traditional notion of forum. Instead, the museum should be both the "temple", or authority, and the "bazaar", an open, collaborative community. This is open authority.'[89] In doing so she proposes a new direction for the museum in light of the collaborative web.[90]

Collection objects and their copies

As SMG's collections are shared through social media, it is important to understand in what form are they being shared. This thesis focuses on digital images of the Group's collection. However, critical framing is needed to understand whether they sit within a digital surrogate discourse, or a discourse on collection copies. For a rigorous theoretical framing of the digital surrogate, Fiona Cameron's chapter from 2007's *Beyond the Cult of the Replicant: Museums and Historical Digital Objects—Traditional Concerns, New Discourses*, locates the concept well. She campaigns for the digital surrogate to have its own autonomy as an object and instead be referred to as a digital heritage object.

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[88] Lori Byrd Phillips, 'The Role of Open Authority in a Collaborative Web', in *Crowdsourcing Our Cultural Heritage* (Ashgate, 2014), pp. 245–67 (p. 248).
[89] Byrd Phillips, p. 250.
[90] However, she does use this metaphor to explain linked data through Wikipedia, which is not social media, therefore not directly applicable.

The relationship of the shared digital image to 'original' collection object is explored in this thesis. This interconnected relationship is explored by attempting to understand the copy or surrogate as carriers of information of the 'original' collection object. Digital surrogate and copy have been used interchangeably to describe the same points thus far, but they will be differentiated, considering the potential position of the surrogate as a master record and how that relates to the digital images that are shared through social media of the SMG collection as copies.

Surrogates and copies can exist in relation to their referent collection object, with surrogates as 'carriers' of information about the original.[91] Both Fiona Cameron and digital heritage researcher John Hindenmarsh describe how 'the information' is carried by the original, but both go on to maintain ambiguity about what this could be, and what form this information would take (i.e., the 'best').[92] Hindmarsh suggests that the form of the surrogate is dictated by the function that it is made to perform.[93] He proposes that the success of a digital surrogate, or what it needs to embody, is defined by its use before creation.[94] Defining collection copies in this way links them to the collection object that they seek to emulate, but never really can.

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[91] Fiona Cameron, 'Beyond the Cult of the Replicant: Museums and Historical Digital Objects—Traditional Concerns, New Discourses', in *Theorizing Digital Cultural Heritage a Critical Discourse* (MIT Press, 2007), pp. 49–76 (p. 55).
[92] J. Hindmarch, Melissa Terras, and S. Robinson, 'On Virtual Auras: The Cultural Heritage Object in the Age of 3D Digital Reproduction', in *The Routledge International Handbook of New Digital Practices in Galleries, Libraries, Archives, Museums and Heritage Sites*. (Routledge, 2019), pp. 243–56 <https://melissaterras.org/2019/11/19/new-book-chapter-on-virtual-auras-the-cultural-heritage-object-in-the-age-of-3d-digital-reproduction/> [accessed 21 January 2020]; Cameron; J. Hindmarch, 'Investigating the Use of 3D Digitisation for Public Facing Applications in Cultural Heritage Institutions' (unpublished Doctoral, UCL (University College London), 2016) <https://discovery.ucl.ac.uk/id/eprint/1527400/> [accessed 21 January 2020].
[93] Hindmarch, p. 105.
[94] Hindmarch, p. 108.

Copies and surrogates existing in relation to collection objects could be interpreted as lacking autonomy. SMG has up to this point collected material culture not, as previously stated, born digital works that relate to science.[95] Representing objects such as software through their material culture counterparts means that the surrogate is likely going to be the representation of the physical object in the collection. Cameron has been an advocate for the surrogate being capable of autonomy, but notes: '[a]s part of the mourning and historical recovery process the replicant is sealed off conceptually. The virtual object is not read as having other messages, its own style, materiality, or acting as a sign substantially different from the physical object.'[96] This autonomy as an object will be important for a digital surrogate having its own future as a heritage object in and of itself, and could be a useful way to frame sharing from digital to digital spaces.

Not acknowledging the relationship with the original object, where it exists, would be an error. SMG curates its collection in the physical buildings, using objects as physical entry points to narratives of science, medicine,[97] industry, media and transport, and to isolate the copy/surrogate from the collection object would be to sever it from its museum context. Hence, the digital image is considered, as well as its narrative or interpretation by the museum, through an in-depth case study chapter later in the thesis. This will support better understanding of the framing of the collection object through social media in the form of a digital image.

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[95] Neil Beagrie and Charles Daphne, *Digital Preservation Gap Analysis Report [Draft]* (Charles Beagrie Ltd, 2019).
[96] Cameron, p. 56.
[97] Vandana Patel, 'Medicine and Me', in *Panel 4: Interpretation in Medical Collections* (presented at the Medicine: The Wellcome Galleries Conference, 2020); Roberta Bivins, 'Late Colonial Medicine, Post-Colonial Communities', in *Panel 4: Interpretation in Medical Collections* (presented at the Medicine: The Wellcome Galleries Conference, 2020).

Authors have identified a binary or dichotomy when seeking to describe a material object and its digital replicant. That is not to say that they agree with this, rather that they recognise it. Some, like Cameron, point to a larger view of how western cultures separate and conceptualise information and materiality.[98] This binary is expressed in different ways and to different degrees when people are either sharing online a picture they have taken in the museum where they have – in a mediated way – experienced the physical collection object; or when they are sharing online a collection image from one digital space to another. This binary is outlined in order to be critiqued here.

Within the literature there is, as yet, no agreement on what makes a digital surrogate different from a copy. It has been suggested that the surrogate is the 'master' record.[99] This would mean the record held by the museum, in its internal systems (in a collection management system [CMS] and/or a Digital Asset Management System [DAMS]), but these are not the digital images that are shared through social media. The shared images may reference back to the digital surrogate with a link if shared through a site like Pinterest. However, images of collections may not include such a reference if people are creating their own images of the objects with a digital camera.

This thesis does not argue that digital images being shared through social media are digital surrogates, as they have been separated from the

[98] Katerine Hayles, 'The Condition of Virtuality', in *The Digital Dialectic: New Essays on New Media / Edited by Peter Lunenfeld.*, Leonardo Books (MIT Press, 1999), pp. 68–95; Paola Di Giuseppantonio Di Franco, Fabrizio Galeazzi, and Valentina Vassallo, *Authenticity and Cultural Heritage in the Age of 3D Digital Reproductions*, ed. by Paola Di Giuseppantonio Di Franco, Fabrizio Galeazzi, and Valentina Vassallo (McDonald Institute, 2018), I, p. 2 <https://doi.org/10.17863/CAM.27029> [accessed 28 January 2020]; Cameron, pp. 64–67.

[99] Hindmarch makes a point derived from work done by David Arnold & Guntram Geser, in the EPOCH Research Agenda for the Applications of ICT to Cultural Heritage Full Report, Archaeolingua (2008). Hindmarch, p. 104.

museum's systems of information, categorisation and understanding. Nonetheless, as it is a useful body of literature for understanding copies of museum collections, it is touched upon.

Digital surrogates sit within a longer history of museum collection copies. They are framed within a longer dialogue among design historians and curators about object copies in museum collections, and an evolving history of technologies used to produce these and the place they occupy within collections.[100] The researcher has previously argued that digital surrogates are made up of a visual representation as well as scholarly knowledge in the form of metadata, taxonomy, links, and so on.[101] If we are to deploy the definition of surrogate production that is use-based (Hindmarch), then the fact that a visitor can make their own copy would perhaps mean that they are producing a surrogate. The surrogate's relationship to both the 'original' collection object and its status as master record for this remain in flux.

Aura, as outlined by Benjamin in his *Art in the Age of Mechanical Reproduction*, has been employed to describe an artwork's exhibition value, cult value, ritual and its being in time and space.[102] Benjamin argued that reproduction diminished the original's aura but importantly he was in favour of this loss as a concession that would enable greater access. Academics

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[100] Malcolm Baker, *The Cast Courts* (The Victoria and Albert Museum, 1982); Cormier Cormier Brendan, *Copy Culture: Sharing in the Age of Digital Reproduction* (V&A Publishing, 2018) <https://vanda-production-assets.s3.amazonaws.com/2018/06/15/11/42/57/e8582248-8878-486e-8a28-ebb8bf74ace8/Copy%20Culture.pdf>; 'History of the Cast Courts · V&A', *Victoria and Albert Museum* <https://www.vam.ac.uk/articles/history-of-the-cast-courts> [accessed 16 October 2024].

[101] Lewis, '"Digital Surrogates": Historically Locating and Understanding the Evolution of Digitized Collection Objects in the Victoria and Albert Museum 1996-2018'.

[102] Walter Benjamin, 'The Work of Art in the Age of Mechanical Reproduction', in *Illuminations* (Schocken Books, 1969), p. 26 <https://web.mit.edu/allanmc/www/benjamin.pdf>.

whose writing pre-dated digital reproduction have argued that aura is in fact increased by viewing copies before encountering the original.[103] In Hindmarch's thesis, he draws a parallel between objects on display in the museum having an affectual power and aura. Then, conflating two theories, aura and the affectual power of objects are used interchangeably as terms.[104]

The nature of the SMG collection is such that aura cannot be applied universally across it. This thesis does not set out to generalise about a collection that contains model Wombles and spaceships. Some objects in the collection are unique, one-off pieces made for a specific purpose: there is only one Apollo 10 command module. However, it is the prevalence of objects in the collection that are products of mass production or multiple production that have informed the decision not to use aura. They are one example of many; they were not made to be unique, but rather to serve a purpose. It is because collection objects demonstrate scientific knowledge and development through material culture that they are part of the collection. Although they have been dislocated from their specific context, they have been chosen because they embody that context. It is people's personal stories about, interactions with and understandings of the objects that this thesis looks to further understand, and it was not possible to gain access to them through aura, with its ineffable description. Therefore,

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[103] Katherine Jones-Garmil, *The Wired Museum: Emerging Technology and Changing Paradigms / Katherine Jones-Garmil, Editor ; Introduction by Maxwell L. Anderson*. (American Association of Museums, 1997), p. 19; Hans Abbing, *Why Are Artists Poor?: The Exceptional Economy of the Arts / Hans Abbing.* (University Press, 2002), p. 308; Michael Betancourt, 'The Aura Of The Digital', in *Critical Digital Studies: A Reader / Edited by Arthur Kroker and Marilouise Kroker.*, Digital Futures, Second edition (University of Toronto Press, 2013, 2013), pp. 433–46 (p. 345); Peter Gorgels, 'Rijksstudio: Make Your Own Masterpiece! | MW2013: Museums and the Web 2013', in *MW2013: Museums and the Web 2013* (presented at the Museums and the Web, 2013) <https://mw2013.museumsandtheweb.com/paper/rijksstudio-make-your-own-masterpiece/> [accessed 28 January 2020].

[104] Hindmarch, pp. 134, 141.

'Object Biographies', that objects like people have their own biographies,[105] was used as an alternate theory through which to interpret digital referents of the SMG's collections.

Digital image as technology

This thesis understands the digital images of SMG objects as a technology of museum collection reproduction. This is not to say that this is the most innovative way to represent the collection, as photography as a 'radical' reproductive technology for collection reproduction peaked in the 19th century,[106] but digital photography is widely used both in the museum, and by audiences who are visiting the museum as a means to represent the collection. There are many technologies of reproduction; replicas in the museum are not new and have a long history.[107] Museum studies that have a digital focus and document technologies used in museum interactive exhibits and to represent collections have sought to explore the potential benefits of these technologies. This thesis, however, is focused on digital images of the SMG collection. These have been framed as a technology of use, taking inspiration from the work of Dave Edgerton in *Shock of the Old*, a work of design history that takes material culture as its basis.

[105] Igor Kopytoff, 'The Cultural Biography of Things: Commoditization as Process', in *The Social Life of Things: Commodities in Cultural Perspective / Edited by Arjun Appadurai*. (University Press, 1986), pp. 64–91.
[106] Mari Lending and others, *Copy Culture: Sharing in the Age of Digital Reproduction* (V & A Publishing, 2018), p. 22.
[107] Lewis, '"Digital Surrogates": Historically Locating and Understanding the Evolution of Digitized Collection Objects in the Victoria and Albert Museum 1996-2018', pp. 26–40; Gordon Fyfe, 'Reproductions, Cultural Capital and Museums: Aspects of the Culture of Copies', *Museum and Society*, 2 (2004), doi:10.29311/mas.v2i1.2783; Benjamin, p. 2; Lending and others, p. 22.

Edgerton's call to action to look at technology *through use* rather than as *linear innovation* is taken up in a limited way here.[108] This thesis critiques the idea that the digital surrogate needs to be the best replica of the original material object available at that time.[109] If this model is used, the surrogate will constantly change as technologies change, are upgraded or become unavailable. This can mean that access to these surrogates is lost. For example, any surrogate that was made to be supported by the Flash browser plugin is now inaccessible.[110] Researching what has been chosen to be developed into the most technologically advanced digital surrogates does tell a narrative, but not one about how people are organically engaging with the breadth of the SMG collection.

Championing of new technologies and ways to make the collection available are an important area of study for both SMG and museum studies: 'Digital copy-making is also improving: becoming more faithful to the original, higher in resolution, capturing details naked to the human eye.'[111] Technological advances lead to better copies, but a reflection on what has gone before is needed.

Advances in technology should not detract from the study of accessible and persistently used reproductive technologies like photography. Edgerton suggests useful things tend to disappear,[112] becoming invisible through

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[108] Although he is taking a global historical argument to mapping technology since 1900 in a non-linear innovation focused way.
[109] Hindmarch, pp. 104–5.
[110] Richard Palmer, 'Restoring the (Digital) Dead • V&A Blog', *V&A Blog*, 2016 <https://www.vam.ac.uk/blog/digital/restoring-the-digital-dead> [accessed 21 January 2020]; Lewis, '"Digital Surrogates": Historically Locating and Understanding the Evolution of Digitized Collection Objects in the Victoria and Albert Museum 1996-2018', pp. 50–53.
[111] Lending and others, p. 20.
[112] Quoting George Kubler in 'The Shape of Time' 1962. Hans Rausing Professor David Edgerton, *The Shock of the Old: Technology and Global History Since 1900* (Oxford University Press, USA, 2007), p. 29.

persistent use and familiarity. Although museum resources and research have been deployed on the most up to date reproductions,[113] why should "invisible" digital images not be considered again? In 2020, only 0.024% of the Science Museum Collection is available as a 3D digital surrogate.[114] This does not mean that a highly accessible and pervasive reproductive technology such as digital images should be ignored. Indeed, its usefulness as a way of sharing a personal perspective will be examined in this thesis.

The digital collection image, although it is a copy or reproduction, is at the time of writing **not** the most up to date way to remotely replicate collection objects.[115] It is, however, one that is supported by the SMG's internal systems (Mimsy XG) and its collections online website, and is the main technology that most collection objects are being reproduced through as part of the 'One Collection' project move of the collection from Blythe House to the new store at Wroughton.[116] It is also an accessible technology enabled by social media sharing.

It may not be innovative, but the photograph is a technology of collection copy and representation with a long history,[117] even before photographs

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[113] Smithsonian, Cooper Hewitt.
[114] There are 287,567 objects on collections online, of these 82,265 have images. 'Science Museum Group Collection'; There are 2 objects and a rendering of the old shipping galleries available. 'Shipping Gallery - A 3D Model Collection by Science Museum Group (@sciencemuseum)', *Sketchfab* <https://sketchfab.com/sciencemuseum/collections/shipping-gallery> [accessed 29 January 2020]; There are 17 (of which one contains 2). '3D Object Archives - Learning Resources' <https://learning-resources.sciencemuseum.org.uk/format/3d/> [accessed 29 January 2020].
[115] '3D Objects for Teachers', *Science Museum* <https://www.sciencemuseum.org.uk/objects-and-stories/3d-objects-teachers> [accessed 1 July 2020].
[116] 'Revealing the Science Museum Group Collection'.
[117] Fyfe; Lewis, '"Digital Surrogates": Historically Locating and Understanding the Evolution of Digitized Collection Objects in the Victoria and Albert Museum 1996-2018', p. 51.

became digital. It could be regarded as ubiquitous because it has been the technology of representation by which collection management systems have documented objects and made them publicly accessible online. Moreover, they are a technology that is easily accessible through camera phones and digital cameras, meaning that audiences can share images they have taken themselves of the collection, or share images of the collection that the SMG has created.

Digital images are accessible to visitors and internet users. Their wide use by museums in an adoption of 'digital' has been commented upon by academics. Andrew Dewdney, art and media researcher, in *The networked image: the flight of cultural authority and the multiple times and spaces of the art museum*, makes this far-reaching statement: 'More importantly, digital technologies drive toward their own invisibility, their infusion into all material psychological things and spaces.'[118] Similar to readings through Edgerton's work, digital images have become so useful we no longer see them. This is process rather than purpose, technology viewed through the lens of innovation, and making the best possible surrogate means that there is a disjointed, changing and technological obsolescence of digital surrogates.[119] Although Dewdney references 'The post-digital perspective',[120] he does not reference Ross Parry's Post-digital Museum, a term used to describe the now pervasive and normalised use of digital in museums:[121] 'The post-digital describes a perspective that, like that of the digital condition, does not focus obsessively upon technical innovation and

[118] Andrew Dewdney, 'The Networked Image: The Flight of Cultural Authority and the Multiple Times and Spaces of the Art Museum', in *The Routledge International Handbook of New Digital Practices in Galleries, Libraries, Archives, Museums and Heritage Sites*. (Routledge, 2020), pp. 68–80 (p. 78).
[119] Dewdney, p. 74.
[120] Dewdney, p. 76.
[121] Parry is very specific about setting up the context of National UK Museums. Ross Parry, 'The End of the Beginning: Normativity in the Postdigital Museum', *Museum Worlds*, 1.1 (2013), pp. 24–39, doi:10.3167/armw.2013.010103.

improvement in digital information technology.'[122] He is not quoting Parry here, but stating that the normalisation of digital and technology in museums is a common theme. He positions what he terms 'the networked image' within this post-digital context – a technology of use embedded in culture.

The digital image as an accessible technology means that a digitised collection exists as one of many networked images. Dewdney suggests that networked images and the digitisation of collections are a catalyst for rapid programming in the physical spaces of art galleries and museums.[123] This thesis, however, is influenced by the assertion that the digitised collection image is a networked image. In their 2023 book, *The Networked Image in Post-Digital Culture*, Dewdney and Sluis introduce the networked image as being a product of the overlap between computational technologies and cultural expression.[124] Past binary understanding would see analogue and digital as oppositional, and understand the image as a part of computational hegemony.[125] The basis for the book is that digital is enmeshed in people lives.[126] They build on Latour's conceptualisation of network, specifically actor network theory (which will be further explored in this thesis in Chapter 5), positing the image as a 'socio-technical assemblage'.[127] The networked image exists within and because of its many linkages: '[a] networked image emerges through the network; its existence is intrinsically entangled and intertwined with software, hardware, code,

[122] Dewdney, p. 77.
[123] Dewdney, pp. 75–76.
[124] Andrew Dewdney and Katrina Sluis, *The Networked Image in Post-Digital Culture* (Routledge, 2023), p. 7 <https://www.taylorfrancis.com/books/edit/10.4324/9781003095019/networked-image-post-digital-culture-andrew-dewdney-katrina-sluis> [accessed 4 July 2022].
[125] Dewdney and Sluis, p. 7.
[126] Dewdney and Sluis, p. 3.
[127] Dewdney and Sluis, p. 5.

programmers, platforms, and users'. [128] One networked image is made of a multitude of connections, can be experienced simultaneously in many places, and is formed of its hardware and software as much as it is the people who made, shared or consumed it.

The networked image is a cultural entity, and the way that it represents museum collections has implications for the image as an expression of authority. In earlier work, Dewdney situates the digital collection image in a project of digitising collections but as a 'networked image' through its presence on 'image sharing platforms' and 'image search engines'. [129] He elaborates on this in a 2020 book chapter, *The networked image: The flight of cultural authority and the multiple times and spaces of the art museum*:

> The networked image is a hybrid of culture and technology founded in and by the world wide web and the internet over the past two decades as computer power has increased and extended. The networked image is not singular or a special kind of conventional visual image. It is a complex and dynamic assemblage of digital capture, data storage, computational orders and social communication practices. In many senses, the term 'networked image' is a temporary placeholder to register a set of radical changes in the conditions and modes of human communication in which the internet, hybrid media platforms and mobile devices have come to dominate. The use of the term has two related sources. First, it retains the established cultural notion of the image as representational, pictorial and conceptual, but problematises this by recognising that indexical and archival representation of a unique point of origin is no longer a sustainable definition for the image, even though paradoxically its reproduction in culture persists. [130]

Through this definition, this thesis considers the multitude of forms a single image can take, and the different description and metadata that might

[128] Dewdney and Sluis, p. 5.
[129] Dewdney, p. 77.
[130] Dewdney, p. 77.

accompany it, whilst at the same time referring back to the source or at least acknowledging its relationship to the source collection object. The museum acts like a bank, where the collection is the gold it keeps in reserve.[131] The understanding of photography as representations of this "gold reserve" is altered when the technology of reproduction is the networked image.

Definitions

The definitions below are of terminology that has been developed for, and/or is from existing literature. These definitions are then drawn upon throughout the thesis, they are introduced and framed below.

Image sharing: In-gallery images and collection photography

There are two types of digital image explored in this thesis: 'in-gallery images' and 'collection photography'. In-gallery images are generated when the collection has been photographed by visitors physically in the various sites of SMG. This physical to digital image taking has been explored by a number of academics working in digital museum studies.[132] Those like Suess suggest a process by which this photographing and sharing takes

[131] Dewdney, p. 75.
[132] Budge; Budge and Burness; Adam Suess and Kylie Budge, 'Instagram Is Changing the Way We Experience Art, and That's a Good Thing', *The Conversation*, 31 January 2018 <https://theconversation.com/instagram-is-changing-the-way-we-experience-art-and-thats-a-good-thing-90232> [accessed 22 September 2019]; Maria Paula Arias, 'Instagram Trends: Visual Narratives of Embodied Experiences at the Museum of Islamic Art – MW18: Museums and the Web 2018', 2018 <https://mw18.mwconf.org/paper/instagram-trends-visual-narratives-of-embodied-experiences-at-the-museum-of-islamic-art/> [accessed 12 September 2019]; Ryan Dodge, 'Unpacking 263,000 Visitor Photos at the Royal Ontario Museum', *Museum-iD*, 2018 <https://museum-id.com/unpacking-263000-visitor-photos-at-the-royal-ontario-museum/> [accessed 20 September 2019]; Villaespesa and Wowkowych.

place.[133] He puts forward a journey that a visitor goes through when sharing a post which happens over multiple stages both inside and outside of the physical museum site, in both physical and digital spaces.[134] These stages – pre-visitation, during visitation, and post visitation – [135] all shape what will eventually be shared from the museum as a post. The other type of digital image shared through social media is museum-produced collection photography. As previously explored by the researcher, this has a history going back to the 1990s when a select group of UK national museums began to digitise their collections and make them available online.[136] This collection photography is produced by the museum, often with the collections object presented on a plain background, as if in a vacuum, removed from context.[137] These images vary in quality as they have been taken in a succession of photoshoots rather than all at once.[138] This practice is explored further in Chapter 4. There are diverse processes, platforms, motivations for recontextualizing, and affordances that act upon these different types of digital collection image as they are shared, which will be discussed in this thesis.

Affordances (Social media)

[133] Adam Suess, 'Instagram and Art Gallery Visitors: Aesthetic Experience, Space, Sharing and Implications for Educators', *Australian Art Education*, 39.1 (2018) <https://search.informit.com.au/documentSummary;dn=625892895569659;res=IELHSS> [accessed 10 March 2020].
[134] Suess, p. 116.
[135] Suess, p. 116.
[136] Lewis, '"Digital Surrogates": Historically Locating and Understanding the Evolution of Digitized Collection Objects in the Victoria and Albert Museum 1996-2018'; Dewdney, p. 75.
[137] As some of the objects in the SMG collection are very large, for example trains and spaceships, this is not always the case.
[138] Lewis, '"Digital Surrogates": Historically Locating and Understanding the Evolution of Digitized Collection Objects in the Victoria and Albert Museum 1996-2018'.

Social media platforms are not a neutral space, as their affordances influence the act of image sharing through them. Thus we have 'the concept of affordance as a key term for understanding and analysing social media interfaces and the relations between technology and its users.'[139] Affordances as (part of) an environment that makes certain actions possible is a concept that partially draws inspiration from Actor Network Theory, an articulation of non-human agency.[140] A rigorous positioning of 'affordances' in various forms through the disciplines from which they emerged is developed in Taina Bucher and Anne Helmond's *The Affordances of Social Media Platforms*. In this thesis, affordances is used to refer to the designed platform environment that enacts on users' sharing of digital imagery. Social media platforms are not a neutral digital tool through which to share.[141] Affordances of the platforms act on the user as they share and recontextualise digital images on them.

Recontextualisation

Just as the spaces of social media are not considered neutral, so the act of sharing the digital image is considered as a recontextualisation of the collection object. The new context in which the digital image, through which the collection object is shared, is situated through the act of sharing is examined here. The act of sharing is an active choice, and to better understand the impetus for this, the new context of the collection object is considered. How a digitised collection object is recontextualised through sharing on Twitter and Pinterest is a key research question for this thesis. Recontextualisation on Twitter includes how the image is recontextualised

[139] Taina Bucher and Anne Helmond, 'The Affordances of Social Media Platforms', in *The Sage Handbook of Social Media* (SAGE, 2017), pp. 233–53 (p. 235).
[140] Bucher and Helmond, p. 242; Bruno Latour, *Reassembling the Social: An Introduction to Actor-Network-Theory*, Clarendon Lectures in Management Studies (Oxford University Press, 2007).
[141] Dewdney, p. 72.

within a tweet, what additionally is included within that tweet such as text, any URLs, hashtag or handle use. For Pinterest, this is how each image is represented in each pin and to which board it is saved. Accompanying description, metadata, geographical tagging, and a new position in a Twitter thread or on a Pinterest board will all be considered.

Digitised collection object

Digitised images of the SMG collection are the focus for this thesis. As outlined previously, this can include images that have been taken by visitors to the museum and shared, and also digital images created by the museum that are then shared through social media. As the focus of the research will be on sharing the collection, this means that there are objects in the museum that will not be included in the data analysed here. These include short-term loans of objects for temporary exhibitions, which, although hosted by the museum, are not part of the collection. However, loaned objects are not excluded from the survey entirely. Objects that are on long-term loan to the museum and have therefore been incorporated into the SMG online collections *have* been considered here as collection objects, for example those on long term loan of medicine objects from the Wellcome Collection.[142] Academics investigating image sharing through museums' social media have also conceptualised the building as a museum object,[143] but this is not the approach taken here. As the SMG collection is at the time of writing mostly a material culture collection, the focus here is on digital images of physical objects.

[142] 'Sir Henry Wellcome's Museum Collection | Science Museum Group Collection' <https://collection.sciencemuseumgroup.org.uk/search/collection/sir-henry-wellcome's-museum-collection> [accessed 16 March 2024].
[143] Arias; Budge and Burness, p. 140.

Research design

Research questions and aims

This thesis seeks to understand how SMG collections have been shared as digital images through social media. These research questions have already been set out at the start of this introduction chapter and are reiterated here. The key research question is ***how*** have digital images of the SMG collection been shared through social media? Sub questions include: does this expand on or provide new understandings of the objects? In what form is the image being shared as a digital object? A key aim will be to understand which objects from the SMG collection are being shared, both from physical in-gallery shots as well as the sharing of existing digital images from the SMG collections online website. The key social media platforms of interest for study are Twitter and Pinterest.

Case studies / platforms of interest

Twitter and Pinterest were identified as platforms for study for a number of theoretical and practical considerations. Key to their identification were the different types of digital images of the collection they could host. The methodology designed for this thesis anticipated collection of a large dataset of images, supplemented by subsequent image content analysis. The length of the period of data collection - six-months - meant that platforms had to be chosen for their accessibility as well as the types of media they support. The extended period of study was needed to capture differing audience behaviours that occur over different academic term times as well as being reflective of public and school holidays and a variety of museum public programmes.

Twitter and Pinterest were chosen as sites of study not only because they each support the sharing of different types of collection photography, but because their APIs were at the time of data collection relatively more open to use than other image sharing platforms. Neither had been studied in terms of the recontextualisation of museum collection images through social media, although the study did build upon the work of humanities scholars from museum and heritage fields using social media as their primary source.[144]

The platforms of study were chosen because of the different affordances they enact on the content they host, which in turn affects the type of digital collection image shared through them. Twitter and Pinterest were selected to reflect the different types of museum collection images that circulate online, which usually come in one of two forms. Firstly, there are those that have been digitised and published by the museums on platforms they own and then subsequently shared. In this form, hosted on museum-owned platforms and linked to scholarly research, digital collection images exist as 'digital surrogates.' It would be incorrect to describe them as such when not hosted on a museum-owned platform or not linked to data beyond solely an image. To look at the sharing of these images, Pinterest was chosen as it was built to facilitate the collecting of extant digital images from the web. Secondly, museum-produced digital collection images were contrasted with images taken in-gallery. Improved infrastructure (Wi-Fi, 4G/5G, smartphone technologies, etc.) and a relaxing of photography restrictions in museums to reflect changing social behaviours has meant that visitors can more easily share images they have taken themselves during their visit. [145]

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[144] Bonacchi and Krzyzanska; Budge; Budge and Burness; Elena Villaespesa and Jennie Choi, 'Pinning Art: The Data and Stories behind Pinterest Traffic to the Online Collection', *Medium*, 2018 <https://medium.com/@elenustika/pinning-art-the-data-and-stories-behind-pinterest-traffic-to-the-online-collection-1b53deac842a> [accessed 20 September 2019]; Arias; Suess and Budge; Dodge.

[145] Dodge; Christine Kuan, 'Maximum Museum: Digital Images, Licensing, and the Future of Museums', 2012, pp. 1–8 (p. 2).

Twitter was therefore chosen as a platform of study that facilitates the sharing in tweets of digital images taken by users as it was more open than other image sharing platforms like Instagram and Facebook. Comparing and analysing these different forms of digital collection image meant that the recontextualisation of museum collections could be explored in digital spaces outside museum-owned sites.

This study utilised a quantitative approach initially to define the content subsequently to be explored in a qualitative manner. It is partially inspired by Bonacchi's work on views expressed about Brexit through evoking and employing heritage sites on social media, in which she describes data collection methods as 'data-intensive heritage ethnographies'.[146] Bonacchi's ideas on the collection of big data have been built on this assertion. Her research collected a large dataset but acknowledged its limitations as representative beyond the data collected for particular research questions, therefore does not claim to be quantitative.[147]

This approach complements the image analysis methods proposed by Gillian Rose,[148] which have been employed in other studies looking at shared digital images of museums through social media.[149] In this way, large image datasets can then be analysed through coded categories, and from these exemplars of different codified images can be identified for in depth study.[150] Here content analysis is employed to identify specific images or image boards that are representative of groups of photographs for further qualitative research.

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[146] Bonacchi and Krzyzanska, p. 1242.
[147] Bonacchi and Krzyzanska, p. 1242.
[148] Gillian Rose, *Visual Methodologies: An Introduction to Researching with Visual Materials*, 3rd ed (SAGE, 2012).
[149] Budge.
[150] Rose, *Visual Methodologies*, pp. 84–104.

Data collection was undertaken in real time rather than retrospectively. Platforms of interest therefore needed to be accessible for data collection from July to December 2019. Social media platforms are constantly changing as sites of study, particularly although not only in relation to the functioning of their APIs. These vary for each platform in terms of the volume of data you can return (i.e., how many 'calls' you make to their servers per hour). Further to this, levels of access granted for the structure in which the data is returned by the API are also determined by the platforms, as are the types of information you can or cannot access (i.e., pins on a Pinterest board but not the 'more ideas' categories that appear for that board). Data is returned in text, CSV or JSON on pins, boards and tweets that share digitised images of the SMG collection. The plain text data returned from the APIs contains unique identifiers that can then be used to refer to content, such as the digital images, hosted on the web platforms Twitter and Pinterest.

Pinterest

Pinterest is an image-based social bookmarking platform, or 'digital pinboard',[151] facilitating discovery and curation of image content that is sourced largely from existing images on the internet.[152] Digital images exist as pins that can then be collected onto boards by users; these boards can be given names; they can be either private or public; additionally they can then be divided into separate sections within a board. The original web page

[151] Kate Clark, 'Pinterest Delivers First Earnings Report as a Public Company', *TechCrunch*, 2019 <http://social.techcrunch.com/2019/05/16/pinterest-delivers-first-earnings-report-as-a-public-company/> [accessed 20 September 2019].
[152] '95% are pinned from preexisting web sources.' Sudip Mittal and others, 'Pinned It! A Large Scale Study of the Pinterest Network', 2014, pp. 1–10, doi:10.1145/2567688.2567692.

from which the 'pin' images are sourced can be navigated to through pins. When creating a pin, or repinning, users are able to add text descriptions to pins as well as adding them to and organising them within boards.

The Pinterest API was used to supplement data collected through analytics. Pinterest's API was open at the time of data collection, in that you could easily get permission to make a limited number of calls an hour to the API. Pinterest only grants a higher level of API access for app developers that it approves, who are then able to make 10 calls per hour.[153] The higher level of access was not granted for this research, so a script was written in Python to make small volumes of calls per hour over a longer period of time.[154] The details of this are fully introduced in Chapter 2.

Pinterest is an established social media platform, with significant usage worldwide, although at the time of research it was not the largest social media platform built around image sharing.[155] Pinterest went public as a company on 18th April 2019,[156] the impacts of which are discussed in the *Methods for digital ephemerality* section of Chapter 2. When considering sites for data collection Pinterest did, however, have a significant number of users: nearly a quarter of the population of the US used it in 2018.[157] It

[153] In practice this varies above and below 10. 'Pinterest Developers' <https://developers.pinterest.com/docs/api/overview/?> [accessed 20 September 2019].
[154] Script written by Martin Steer. See Appendix 2 - Pinterest API Python Script run on Jupyter Notebook for full script.
[155] 'This year, 104.7 million people in the US—or 31.8% of the population—will use Instagram, a 13.1% increase from 2017, according to eMarketer estimates'. Rimma Kats, 'How Many People Use Instagram in the US 2018 - eMarketer Trends, Forecasts and Statistics', *eMarketer*, 2018 <https://www.emarketer.com/content/the-social-series-who-s-using-instagram> [accessed 20 September 2019].
[156] Erin Griffith, 'Pinterest Prices I.P.O. at $19 a Share, for a $12.7 Billion Valuation', *The New York Times*, 18 April 2019, section Technology <https://www.nytimes.com/2019/04/17/technology/pinterest-ipo-stock.html> [accessed 16 December 2023].
[157] Kats.

reported 291 million monthly active users for the first quarter of 2019.[158]

Additionally, in 2019 the SMG had a large number of Pinterest followers.[159]

Figure 1 - Screenshot of Science Museum Pinterest 'All pins' home page, when logged in by the researcher as Science Museum, navigation to the 'Analytics' function for business accounts can be seen in the top left. The SMG switched the pictured Pinterest account to 'Science Museum Group' after the period of data collection, but while the researcher was based at the Group. Screenshot taken 11 November 2019, it has been edited to remove personal identifiers. The image cited here has been redacted to prevent copyright infringement.

As the SMG has one online collection, there is only one SMG Pinterest account that was used for data collection. This is unlike the approach taken by the Group's museums on other social media platforms, where they each have a named account.[160] As business Pinterest accounts can be linked to a single website, the SMG's digital online collections are linked through the Science Museum's website, for which collections online is a subdomain. The account switched from being Science Museum London (Figure 1) to SMG wide during the period of data collection. It was for this reason that the Science Museum Pinterest account is the only data collection point.

[158] Clark; Lauren Feiner, 'Pinterest Shares Plunge 15% after First Earnings Report on a Weak Outlook', *CNBC*, 2019 <https://www.cnbc.com/2019/05/16/pinterest-reports-q1-2019-earnings.html> [accessed 20 September 2019].

[159] 232.2k monthly unique viewers | 87,152 followers as of 18 June 2019.

[160] The national railway museum does have a Pinterest account for corporate events called "corporate events at the National railway museum". As of 04-07-2019 it had 11 followers. Much like the @SCM_Events accounts these have not been included in the data collection as they are part of the corporate function of the museum.

Pinterest is under-represented in academic writing about digitised collection images on social media, and there is a clear need to study the use of museum collections from a user perspective on Pinterest. The 2022 work of Professor Bodil Axelsson explores recontextualisation of images of Viking-associated jewellery from museum collections through shared curatorial agency between Pinterest users and Pinterest's machine learning model, using qualitative digital ethnography methods.[161] Work by Elena Villaespesa and Jennie Choi while based at The Metropolitan Museum of Art, in *Pinning Art: The Data and Stories behind Pinterest Traffic to the Online Collection*, looked at the use of their collection on Pinterest and utilised Pinterest and Google Analytics as routes of data collection.[162] This thesis will build on Villaespesa and Choi's use of Pinterest analytics as a data collection method, although the focus will not be on user metrics but rather on the content users share and how they share it.

A key consideration for this research is the recontextualisation of existing collection images, therefore Pinterest was chosen as a site of study. Almost all pins are sourced from existing images on the web, before being placed in a new context by users.[163] Images that are saved are likely to have been initially digitised by the SMG and hosted on their website, before being shared on Pinterest. Methods employed in this thesis for data collection will be based on these behaviours, building on Villaespesa and Choi's work, and using the SMG's Pinterest analytics account, which is tethered to the Group's website, as the collection point for data. Although there are a number of actions that can happen to Pinterest pins, this

[161] Bodil Axelsson, 'Viking Jewellery on Pinterest: Drifting Digitisations and Shared Curatorial Agency', in *Museum Digitisations and Emerging Curatorial Agencies Online: Vikings in the Digital Age*, ed. by Bodil Axelsson and others (Springer International Publishing, 2022), pp. 71–94, doi:10.1007/978-3-030-80646-0_4.
[162] Villaespesa and Choi.
[163] Mittal and others.

research focuses on the action of 'saving', as this represents an active choice to recontextualise the image.

Twitter

The data structure for Twitter was relatively simple in comparison to other platforms.[164] As a microblogging platform, each tweet was singular but then could be related to other tweets through threads. Tweets could also be linked through comments or other users retweeting content to their followers. Each tweet had the potential to contain text and media, and as the service could be accessed through desktop or phone, there was the potential for both types of images described in this thesis to be shared. Simple structures meant that data on Twitter was able to be collected or harvested easily for research.

The levels of popular usage of Twitter suggested that there would be sufficient users to study images shared on the platform. Twitter had the biggest following of any of the SMG social media sites at the time of data collection, with the total followers for the combined SMG collections-focused Twitter handles coming to 803,541.[165] Although this study is not looking at the output of the museums' platforms, this could be an indicator of platform engagement with the SMG. Twitter refers to its 134 million daily

[164] Bonacchi and Krzyzanska, p. 1240.
[165] Science Museum Group Social Media followers as of 18 June 2019: @sciencemuseum - 670K followers, @SM_learn - 4,072 followers, @SM_Conservation - 907 followers, @sim_manchester - 31.5K followers, @railwaymuseum - 40.4K Followers, @LocomotionSHD - 3,862 followers, @mediamuseum - 52.8K followers. Compared to Total across museum sites marked for collection on instagram – 214,904, Facebook – 418,964, You Tube - 12,446 Subscribers (only for Science Museum, London site).

users in its financial reporting as 'monetizable daily active usage.'[166] Further data on monthly active users also suggests that the platform was continuing to grow slowly at the time of research.[167] Twitter was not the only platform on which image sharing is available, but it has had a significant usage worldwide and was a popular platform with SMG social media audiences at the time of data collection, and therefore a suitable platform on which to test in-gallery image sharing.

As a social media platform, Twitter used to be very open and had a number of software programs developed specifically to facilitate academic research.[168] Software such as the Twitter Capture and Analysis Toolset (DMI-TCAT) has been developed for academic use.[169] This relative ease of access has prompted a lot of academic research to be undertaken on the platform. Despite this, however, there have not yet been any long-term academic studies that look specifically at the sharing of museum collections from a user perspective.[170]

Platforms excluded from study

[166] Twitter, 'Investor Fact Sheet Q1 2019', 2019 <https://s22.q4cdn.com/826641620/files/doc_financials/2019/q1/Q1_19_InvestorFactSheet.FINAL.pdf>.
[167] '330 million monthly active users Q1 2019 versus 321 for Q4 2018 and 326 million for Q3 2018'. 'Top 10 Twitter Statistics - Updated July 2019 - Zephoria Digital Marketing', *Zephoria Inc.*, 2019 <https://zephoria.com/twitter-statistics-top-ten/> [accessed 20 September 2019].
[168] Dan Kerchner and Laura Wrubel, 'Social Feed Manager & Social Media Archiving' (unpublished Power Point presented at the Web & Social Media Archiving for Community & Individual Archives: a DPC Briefing Day, 2018) <https://www.dpconline.org/docs/miscellaneous/events/2018-events/1953-websmarchcommarch-sfm/file>.
[169] Erik Borra and Bernhard Rieder, 'Programmed Method: Developing a Toolset for Capturing and Analyzing Tweets', *Aslib Journal of Information Management*, 66.3 (2014), p. pp.262-278, doi:10.1108/AJIM-09-2013-0094.
[170] Dodge.

Platforms such as Instagram, Facebook and Flickr that support or were built around digital image sharing could have been potential sites of study but were not included in this research. An app-first platform, Instagram is built around image sharing and in mid 2019 had a billion plus people actively using the platform.[171] It could have been a potential platform of study to understand how visitors were sharing images of the collection when encountered in the sites of the museum. Similarly, although with a much smaller usage (over 90 million active users),[172] Flickr is structured around image sharing. Simon uses Flickr as an example of a platform that supports social behaviours around objects (here a digital collection image) that would not ordinarily be supported in the physical space of the museum.[173] Additionally, Sluis has used Flickr to consider shared '[a]mateur snapshot' digital images[174] as training data for machine learning models.[175] Flickr has been used to host digitised collections on GLAM (galleries, libraries, archives and museums) owned accounts, such as the million images of the British Library that were released onto Flickr Commons in 2013.[176] Although potential sites of study they were discounted from the final research design.

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[171] Instagram, 'Our Story', *Instagram*, 2016 <https://instagram-press.com/our-story/> [accessed 8 July 2019].

[172] Over 90 Million active users as of 23 March 2019. Craig Smith, '20 Interesting Flickr Stats and Facts | By the Numbers', *DMR*, 2019 <https://expandedramblings.com/index.php/flickr-stats/> [accessed 20 September 2019].

[173] Simon, *The Participatory Museum*; The Library of Congress, *Workers Leaving Pennsylvania Shipyards, Beaumont, Texas (LOC)*, 1939 <https://www.flickr.com/photos/library_of_congress/2179123671/> [accessed 20 September 2019].

[174] 'The Networked Image after Web 2.0: Flickr and the "Real-World" Photography of the Dataset', in *The Networked Image in Post-Digital Culture*, by Katrina Sluis (Routledge, 2023), pp. 41–59 (p. 49) <https://www.taylorfrancis.com/books/edit/10.4324/9781003095019/networked-image-post-digital-culture-andrew-dewdney-katrina-sluis> [accessed 4 July 2022].

[175] 'The Networked Image after Web 2.0: Flickr and the "Real-World" Photography of the Dataset', p. 43.

[176] 'The British Library Puts 1,000,000 Images into the Public Domain, Making Them Free to Reuse & Remix | Open Culture' <http://www.openculture.com/2013/12/british-library-puts-1000000-images-into-public-domain.html> [accessed 20 September 2019].

Some platforms were ruled out as potential sites of study because of their relatively closed APIs, and the limiting effects this would have had on analysis methods. APIs allow for data from platforms to be collected on a large scale in a form that can facilitate certain analysis methods. As this research looked at large datasets of digital collection images, it was necessary to collect in part through APIs. Therefore, having limited or no access to platforms through APIs constituted a significant restriction of methods. This ruled out Instagram, as its API has been deprecated.[177] Instagram is a subsidiary of Facebook, and the limiting of API access came in the wake of the Cambridge Analytica revelations.[178] Facebook's API access was similarly restricted. This has affected researchers, as the Instagram API changes meant that data became inaccessible for large-scale analysis.[179]

Previous work undertaken on sharing museums' images specifically through Instagram suggests a need for manual, labour-intensive collection to circumvent closed APIs. This methodology was not feasible when transferred to a six-month data collection period, collecting through geotagged posts for only a week as Kylie Budge and Alli Burness did for their 2018 paper *Museum objects and Instagram: agency and communication in digital engagement*.[180] As a method it would be overly time intensive for this reason, therefore Instagram was not used as a platform of study.

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[177] Ravi Gummadi, 'Instagram Graph API Launches and Instagram API Platform Deprecation', *Facebook for Developers*, 2018 <https://developers.facebook.com/blog/post/2018/01/30/instagram-graph-api-updates/> [accessed 20 September 2019].
[178] Carole Cadwalladr, 'Cambridge Analytica a Year on: "A Lesson in Institutional Failure"', *The Guardian*, 17 March 2019, section UK news <https://www.theguardian.com/uk-news/2019/mar/17/cambridge-analytica-year-on-lesson-in-institutional-failure-christopher-wylie> [accessed 20 September 2019].
[179] Marco Bastos and Shawn T. Walker, 'Facebook's Data Lockdown Is a Disaster for Academic Researchers', *City, University of London*, 2018 <https://www.city.ac.uk/news/2018/april/facebook-data-academic-research> [accessed 20 September 2019].
[180] Budge and Burness.

The platforms of interest were selected to capture the recontextualisation of digital images of the SMG's collection shared by users of and visitors to the museum. Numbers of followers were taken into consideration as engagement indicators with SMG's different platforms, but this study is not looking at the output of these museum accounts, and they have not been analysed here.

Different types of shared digital collection images are supported by different platforms, therefore two were chosen to compare and contrast these differences: Pinterest and Twitter. This was not the only consideration for choosing platforms of interest, as there were key practical considerations, such as openness of APIs to undertake large-scale data collection. This is not a big data research project, and therefore representativeness needs to be considered when working with large datasets[181] to understand how digital images of the SMG's collection have been (re)used on social media and whether this recontextualisation expanded on or provided new understandings of the objects.

Thesis structure

This thesis consists of six chapters. The introduction and this first chapter cover the SMG collection and five museums as a site of study. They define what is meant in terms of what images are shared, social media affordances and recontextualisation of the digitised collection object. The introduction also contains a literature review, building on museum studies literature that deals specifically with social media and design history texts.

[181] Bonacchi and Krzyzanska.

Platforms of interest are introduced, before the ethical framework for undertaking and analysis of primary data is outlined.

Chapter 2 explains the methods used in this thesis. It draws heavily on digital humanities literature and in particular on the large body of existing literature for researching Twitter. It covers both quantitative and qualitative methods. It will introduce ethical considerations for conducting research into social media, outlining methods of data collection and processing through Twitter and Pinterest's APIs. It also introduces qualitative methods such as semi-structured interviews with SMG staff, whilst framing these within researcher reflexivity. It will cover analysis methods, such as content analysis for images and utilising OpenRefine for primary data wrangling and augmentation. Finally, it will outline the ways in which methods were designed to adapt to digital ephemerality, a key component and finding of conducting digital humanities research.

The next two chapters examine, in turn, the different types of digital collection image that are shared. Chapter 3 focuses on physical encounters with SMG collection object that have been shared digitally, it looks at physical-to-digital sharing in the museum, and therefore will consider how digital images are shared through Twitter exclusively. This in-depth look at in-gallery images will use both quantitative methods to collect and process tweets and qualitative methods such as interviews to understand better how visitors were taking images of the collection in the museum sites of the SMG nationally and posting them to Twitter, and then sharing them with either a consistently used SMG hashtag or museum handle. Chapter 4 considers how digital images of collection objects produced by SMG are then re-shared through both Twitter and Pinterest. Digital-to-digital sharing refers to how images of collection objects have been encountered digitally, with them being shared from online sites of the Group like collections

online,[182] or re-shared by users who have encountered the image on social media platforms. It starts by outlining what collection photography is, its aesthetic and how it has been framed and understood in the literature. The chapter focuses on the recontextualisation of images of these already digitised collection objects, which objects have been shared from the SMG collection and how these digital images have been shared.

The penultimate chapter will look at *Automating context: how infrastructures facilitate the sharing of museum interpretation through shared digital images*. This is a case study chapter that builds on findings from both Chapters 3 and 4 and considers how SMG collection interpretation is also shared in the act of sharing digital collection images. It specifically considers how this may take place automatically through an interplay between the digital object being shared (the digital image of collection object and embedded metadata), collection data infrastructures (SMG's collections online and collections management system) and social media platforms (inclusive of middleware and knowledge graphs). It will build on Actor Network Theory and object biography as key theories and will use interviews with SMG staff to understand how SMG understands their contextualisation of their collection. Finally, the conclusion will summarise the findings of this thesis and reflect on **how** digital images of the SMG collection have been shared through Pinterest and Twitter.

[182] 'Science Museum Group Collection'.

Chapter 2 – Methodology

Introduction to methods

This thesis employs a mix of computational and qualitative methods to understand how SMG's collections have been shared as digital images through social media. It uses computational methods to gather, augment and analyse digital source material. Digital images and metadata from the social media posts they have been shared were analysed, along with SMG's collections and online collections data. Qualitative primary research was essential for contextualising and further understanding digital sources. Interviews have been a key research method employed and introduced below.

This methodology was devised specifically to address how digital images of SMG collection objects have been shared through Pinterest and Twitter. First outlined in the methodology are the ethical considerations that informed the research design of this thesis. The ethical implications of the research and the data used were thought through before the data collection commenced in 2019 and reevaluated throughout. The platform-specific methods are outlined in this chapter, starting with Pinterest. The collection of data from Pinterest analytics was supplemented with data from its then open (but restricted) API. The processes for linking this with SMG collections data are noted, along with how these data collection and supplementation methods were merged with hand-annotated data. At this point, the concept of digital ephemerality and its impact on methods is introduced. Incorporating digital ephemerality into DH methodologies is essential as it is perhaps the one unifying inevitability when undertaking DH research on social media. Next, Twitter methods are presented, including how tweets were collected through the then open API using SMG handles and hashtags consistently used by the Group during the data collection

period. Then critical approaches to images used in this thesis are outlined, using image metadata and methods including content analysis, building on the work of Gillian Rose, before reflections on researcher reflexivity are explored. The methods chapter concludes with a description of the qualitative interviewing methods employed. Semi-structured interviews were undertaken using Microsoft Teams video calls, largely during the period of various restrictions caused by the COVID-19 pandemic. It was essential to undertake both qualitative and computational methods to be able to critically approach how images of collection objects were being shared through social media.

Ethical considerations for social media research

Social media is not static, and it is therefore essential that ethical principles from humanities research employed in its analysis should reflect its changing nature as a site of study. New platforms are constantly being created, with their own developing social norms. Even on established platforms the algorithms that shape them change through regular updates. Therefore, methodologies have to evolve and adapt. This has been reflected in frameworks for ethical research and best practice literature created to inform ethical internet research, underpinned by established practices such as "do no harm". Social media platforms are the environment and content published thereon is the focus of the study. This content is produced by people, therefore methods such as de-identification have been employed as well as adhering to General Data Protection Regulation (GDPR) rules. Methods constructed around Nissenbaum's theory of contextual integrity informed consent in relation to public and private spaces of social media research.[183] Content for study was chosen according to what had been published on publicly accessible platforms by accounts marked as public that can be seen without needing to log in at the time of the study. After becoming X, the platform

[183] Helen Fay Nissenbaum, *Privacy in Context: Technology, Policy, and the Integrity of Social Life* (Stanford Law Books, 2010).

oscillated between allowing and not allowing access to unregistered users to view content without having logged in.[184] In the case of Twitter only tweets that were intended to be searchable, or addressed SMG accounts directly through their handles were looked at. Research methods were designed in line with the platforms' terms and conditions, to ensure their legality. This research builds on a growing body of literature on social media and internet research.[185]

Social media research would not be possible with one rigid set of universally applicable rules, because social media is not one homogenous site, and it is also constantly changing through ownership and updates. Flexible guidelines for ethical research and best practice frameworks that can be adapted to a range of contexts have therefore been built here. The rise in digital internet research methods has prompted academic researchers to assess ethical practice and methods in this relatively new, but importantly, constantly evolving field. Set ethical "principles" are often recommended, involving self-reflection within the project, rather than a fixed set of rules. Guiding principles such as those found in *Ethical Decision-Making and Internet Research: Recommendations from the AoIR Ethics Working Committee* are similar to those often raised in general literature.[186] For this study, collection and processing of social media data has also been considered in relation to other best practice frameworks, as well as non-subject-specific texts for "responsible" processing of

[184] Aisha Counts, 'Twitter Blocks People From Seeing Tweets Unless They're Logged In', *Bloomberg.Com*, 30 June 2023 <https://www.bloomberg.com/news/articles/2023-06-30/twitter-blocks-people-from-seeing-tweets-unless-registered> [accessed 7 March 2024]; Ivan Mehta, 'Twitter Silently Removes Login Requirement for Viewing Tweets', *TechCrunch*, 2023 <https://techcrunch.com/2023/07/05/twitter-silently-removes-login-requirement-for-viewing-tweets/> [accessed 7 March 2024].

[185] Budge; Suess; Arias; Marty Steer, Naomi Wells, and Jane Winters, 'Cross-Language Dynamics and the Royal Opera House: Live Cinema Relays and Social Media Use' <https://crosslanguagedynamics.blogs.sas.ac.uk/research-projects/project-3/cross-language-dynamics-and-the-royal-opera-house-live-cinema-relays-and-social-media-use/> [accessed 31 March 2024].

[186] Annette Markham and Elizabeth Buchanan, 'Recommendations from the AoIR Ethics Working Committee (Version 2.0)', 2012, pp. 1–19.

big data.[187] These texts can be applicable to different types of research and are interdisciplinary in origin.

This research builds upon ethical principles outlined by Matthew J Salganik in *Bit by Bit*. Writing at the intersection of two disciplines, Salganik's survey text looks at the ethics of internet research; *Bit by Bit* introduces digital social research methods for an intended audience of social scientists and data scientists.[188] It positions digital research method theory between the major reports which have shaped practice – notably the Belmont and Menlo reports – and builds on the existing research principles that they outline, such as respect for persons, beneficence, justice, respect for law and public interest.[189] Suggested best practice through these principles and ethical frameworks that address challenging areas and offer practical tips, like others, does not give a one-size-fits-all set of rules. Salganik highlights challenging areas of ethical practice, such as informed consent; understanding and managing informational risk; privacy and ethical decision-making in the face of uncertainty.[190] Practical tips for research IRBs [Institutional Review Board] are a start not an end; researchers should put themselves in the position of those they seek to research; and finally, ethics should be 'continuous and discrete'.[191] The comprehensiveness of Salganik's text places ethical practice within a longer ethical history, thus making it a more generalised case for digital ethical practices.

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[187] Matthew Zook and others, 'Ten Simple Rules for Responsible Big Data Research', *PLOS Computational Biology*, 13.3 (2017), p. e1005399, doi:10.1371/journal.pcbi.1005399; 'The Data Ethics Canvas – The ODI', 2019 <https://theodi.org/article/data-ethics-canvas/> [accessed 18 June 2019].
[188] Matthew J. Salganik, *Bit by Bit: Social Research in the Digital Age* (Princeton University Press, 2018).
[189] Salganik, p. 325.
[190] Salganik, p. 325.
[191] Salganik, p. 325.

Regarding ethics as a singular moment in a social media research project is problematic. Existing research has attempted to produce a workable framework for best practice in social media ethics. The *Framework for addressing ethical considerations in social media research,* a policy paper to ensure that no harm comes to people included in the dataset, considers the legality of the research, privacy and risk, as well as it's re-use and publication.[192] Although this framework is unusual for having clear check points, there are principled ethical research texts that insist on continuous re-evaluation of the ethics of internet research.[193]

"Do no harm" is an established concept of research ethics, and understanding its history within social media has informed the research design for this project. Harm can be caused by social media research, for example when people and their data (social media posts) are taken out of the context of social media platforms and put in the context of the study.[194] Ethical guideline documents are regularly contextualized by oft-cited examples of bad practice including Harvard's *Tastes, Ties and Time*, the Okcupid study or emotional cognition.[195] They exemplify research undertaken on social media that did not understand individuals' personal information in a social media context. The sites

[192] Leanne Townsend and Claire Wallace, 'Social Media Research: A Guide to Ethics' (The University of Aberdeen, 2016), p. 8.
[193] Salganik, pp. 324–25.
[194] Leanne Townsend and Wallace, p. 7; Fabian Neuhaus and Timothy Webmoor, 'AGILE ETHICS FOR MASSIFIED RESEARCH AND VISUALIZATION: Information, Communication & Society: Vol 15, No 1', 2011 <https://www.tandfonline.com/doi/abs/10.1080/1369118X.2011.616519> [accessed 2 July 2019].
[195] Kevin Lewis and others, 'Tastes, Ties, and Time: A New Social Network Dataset Using Facebook.Com', *Social Networks*, 30.4 (2008), pp. 330–42, doi:10.1016/j.socnet.2008.07.002; Brian Resnick, 'Researchers Just Released Profile Data on 70,000 OkCupid Users without Permission', *Vox*, 2016 <https://www.vox.com/2016/5/12/11666116/70000-okcupid-users-data-release> [accessed 22 June 2019]; Salganik; Michael Zimmer, 'Addressing Conceptual Gaps in Big Data Research Ethics: An Application of Contextual Integrity', *Social Media + Society*, 4.2 (2018), p. 2056305118768300, doi:10.1177/2056305118768300; Annette N Markham, Katrin Tiidenberg, and Andrew Herman, 'Ethics as Methods: Doing Ethics in the Era of Big Data Research—Introduction', *Social Media + Society*, 4.3 (2018), p. 2056305118784502, doi:10.1177/2056305118784502.

of collection for the social media data for this research were only ever on publicly accessible spaces. Not only are private accounts (for Twitter) or boards (for Pinterest) excluded from the study, but all of the collected content was available to access through a desktop browser without having to be a member of or log in to the platforms.[196] Furthermore, the content that is being posted is concerned with images of museum collections, therefore before undertaking the study, the data collected did not include sensitive material that relates to a person, and is unlikely to contain special category data.[197] The dataset that was collected will not be published, nor will it be merged with any other datasets relating to people's identities.

Usernames were collected as part of the research, and therefore measures were taken to make sure ethical expectations for working with such data were met.[198] These reflected current discourses on de-identification, where all reasonable effort is made to alter data so that it does not disclose a person's identity. Debate is currently taking place around use of the terms anonymization and de-identification,[199] although in a recent House of Lords report both were introduced as interchangeable.[200] Anonymization means that it is impossible to reidentify a person in a dataset, whereas de-identification means that it is next to impossible. As digital health and privacy specialist Mohammed Khan elaborates in his work, *Big Data Deidentification, Reidentification and Anonymization*, 'Deidentification is the altering of personal data to establish an alternate use of

[196] Those that have been marked as private, in the case of Twitter shared only with followers and with Pinterest first person only, were excluded from this thesis.
[197] 'Data Protection Glossary - Academic Registry and Council Secretariat' <http://www.arcs.qmul.ac.uk/governance/information-governance/data-protection/dp-glossary/> [accessed 22 September 2019].
[198] Markham and Buchanan.
[199] Cisa Mohammed J. Khan, 'Big Data Deidentification, Reidentification and Anonymization', 2018 <https://www.isaca.org/Journal/archives/2018/Volume-1/Pages/big-data-deidentification-reidentification-and-anonymization.aspx?utm_referrer=> [accessed 20 June 2019].
[200] House of Lords, *AI in the UK: Ready, Willing and Able?*, Report of Session 2017–19 (House of Lords, 16 April 2018), pp. 1–183 (p. 31) <https://publications.parliament.uk/pa/ld201719/ldselect/ldai/100/100.pdf>.

personal data so it is next to impossible to identify the subject from which the data were derived.'[201] Or, as explained in the House of Lords debate on the subject, 'De-identification often means removing identifying features'.[202] As datasets that relate to people's identities grow and technologies that can be used to efficiently cross reference them become more efficient, the challenges will only increase.[203] This research concerns itself with the social media post information that people have actively sought to share, rather than metadata or location data that occurred as a consequence of the action of posting, therefore these potentially identifiable vectors of information have not been studied.[204] Instead, this research looks at the text and images people meant to share, what they wanted people to see, and how people shared the SMG's collections in the public spaces of social media. Any identifying information (such as usernames or social media object URLS) was excluded from the final thesis, with identifiers only being listed if it was a public figure or organisation being cited.

There are general standards when dealing with personal data, but researchers need to surpass these in order to conform to broader legal standards for processing personal information. Although not the focus of the research, the chosen methods did involve collection of some personal information, which was processed and stored in line with data management planning and GDPR.[205] Specifically, usernames were collected in the initial large-scale data collection as a by-product of data collection methods and their embedding in URLs.[206] A publicly accessible expert profile was live throughout the research on the School of Advanced Study, University of London website, where contact information and further details about the nature of the research could be found. The research was

[201] Mohammed J. Khan, para. 5.
[202] House of Lords, p. 31.
[203] House of Lords, p. 31.
[204] Zook and others, p. 311.
[205] 'GDPR and Research – An Overview for Researchers' (UK Research and Innovation) <https://www.ukri.org/files/about/policy/ukri-gdpr-faqs-pdf/>.
[206] For Twitter usernames collected automatically with the TCAT software. For Pinterest usernames can be collected as a by-product as part of URL, if not explicitly.

also listed on the SMG's website.[207] Having the research searchable and accessible in this way meant that personal data was processed lawfully.

Data collection was limited to tweets, pins or Pinterest boards in which Science Museum Collection objects feature. This research does not look at individuals' patterns of behaviour over time but rather at posts containing digital images depicting the SMG collections. Tweets were selected by identifying those posts that contained Twitter handles for the SMG Twitter accounts or official SMG exhibitions hashtags, that is, those seeking to be searchable and participate in a broader conversation on Twitter rather than just being seen by immediate followers. This research is concerned only with tweets that were made more publicly searchable/findable in an already public online space. Data collection methods were constructed in this way to adhere to expected flows of information (a concept articulated by Helen Nissenbaum and introduced later in this section).

The public nature of published content for primary data collection on Pinterest was similarly considered. Digital collection images originally sourced from the Science Museum [Group] Website are the focus of collection and study,[208] as well as the boards to which they are pinned. Again, any data collection is limited to what is publicly accessible. Digital images from the Science Museum Group collection saved as pins were only part of the dataset if they were saved to public boards; no private boards were included in the study.

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[207] 'Ms Rhiannon Lewis | School of Advanced Study' <https://research.sas.ac.uk/search/student/1304/ms-rhiannon-lewis/> [accessed 22 September 2019]; 'Funded CDP Students and Projects | Science Museum Group' <https://www.sciencemuseumgroup.org.uk/our-work/research-public-history/collaborative-doctoral-awards/funded-cdp-students-and-projects/> [accessed 22 September 2019].

[208] Linked website 'Home', *Science Museum* <https://www.sciencemuseum.org.uk/home> [accessed 22 September 2019]; Collections subdomain 'Science Museum Group Collection'.

Broader debates on the nuances of participation in public spaces online informed research design. *Social Media Research: A Guide to Ethics* by Leanne Townsend and Claire Wallace addresses questions of informed consent, and although the guide points out that it is problematic, rather than offering set rules, it does suggest areas to consider, such as the ephemerality of the medium. If a post is deleted, the guidelines question whether this is akin to withdrawing from the study if consent has not first been sought. Moreover, the authors outline what the user might reasonably expect to be private in the content they have posted.[209] Academics expressing their conception of people's privacy in relation to social media platforms – or more broadly in a new epoch of personal visibility through online information – were key to understanding consent.

Privacy is not a universal concept, and researchers and academic frameworks have struggled to define it: 'Individual and cultural definitions and expectations of privacy are ambiguous, contested, and changing'.[210] Helen Nissenbaum's *Privacy in Context: Technology, Policy and the integrity of Social Life* does not seek to define privacy although it is largely concerned with it:

> Many of them [writers of the growing body of work against erosion of privacy through technological systems] argue that protecting privacy means strictly limiting access to personal information or assuring people's right to control information about themselves. I disagree. What people care about the most is not simply *restricting* the flow of information but ensuring that it flows *appropriately*, and an account of the appropriate flow is given here through the framework of contextual integrity.[211]

That people can expect to have information "flow" in ways shaped by convention and societal expectations is key to Nissanbaum's argument. Nissenbaum explores and expands on how context and people's expectations for their data are linked. She begins with understanding privacy and moves on to 'personal

[209] Leanne Townsend and Wallace.
[210] Markham and Buchanan, pp. 6–7.
[211] Nissenbaum, pp. 1–2.

information flows',[212] and importantly, people's expectations around these. The concept of expected flows of information has underpinned the data collection methods in this research design.

Nissenbaum asserts that privacy is not conceptualised as an individual's ability to control others' access to their personal information, but rather as the meeting of their expectations about how that data should be used in a particular context in a particular way.[213] There are two key constructs for the framework of contextual integrity: structure of contexts and informational norms.[214] Thus, the context of information published to Twitter and Pinterest, and the 'informational norms' this content would ordinarily have enacted on it were given due consideration.

As stated previously, this study did not seek informed consent for the primary social media data collection, because the public nature of the data had been thoroughly considered using Nissenbaum's theory of contextual integrity – a heuristic framework. This heuristic framework has been successfully employed by academics – such as privacy and social media computer science scholar Michael Zimmer – to assess the ethical practice of previous studies,[215] as well as being cited in guidelines for good practice.[216]

In order to conduct research on social media platforms legally, the terms of service or terms and conditions must also be worked within,[217] although they

[212] Nissenbaum.
[213] Nissenbaum, p. 128.
[214] Nissenbaum, p. 232.
[215] Zimmer.
[216] Markham and Buchanan, p. 7.
[217] Leanne Townsend and Wallace.

should be seen as a start and not an end point.[218] The research methods developed in this thesis involved the automation of some data collection from the Pinterest platform, through the Science Museum account's analytics portal and the Pinterest API. Dialogue with Pinterest was attempted in order potentially to seek permission for a higher level of access then was freely available, but this was only ever an initial conversation. Quantitative analysis was undertaken through the business analytics portal and the restricted API of Pinterest boards containing SMG collection images. Both these sources of information are accessible to the Science Museum through their Pinterest account, and by extension to the researcher based at the museum.

Ethics and specifically recently produced ethical frameworks for social media research were thoroughly considered in the construction of this research design. By using approaches that make ethics an ongoing concern throughout the project, research can be both thorough and responsive to the ephemeral nature of social media as a changeable site of study. Methods for data collection and analysis were designed around published data relating to people, and therefore were made GDPR compliant. Moreover, Nissenbaum's theory of contextual integrity was employed to conceptualise the study of the use and reuse of digital images from the SMG collection through social media, thereby ensuring that it would be within expected or normal flows of information. Finally, methods were developed in line with platforms' terms and conditions, and community guidelines.

Pinterest

[218] Rhiannon Lewis, 'In Response to the Web & Social Media Archiving for Community & Individual Archives Briefing Day: Archiving Images from Social Media - Digital Preservation Coalition', *Digital Preservation Coalition*, 2019 <https://www.dpconline.org/blog/in-response-to-a-briefing-day> [accessed 22 September 2019].

Pinterest is a social media platform that is designed for images, its user interface is built to facilitate encountering, searching, sharing, and curating images. This thesis sought to understand how pins created from SMG collection have been shared, however the examples of the user interface given as examples below are from the SMG official accounts. These screenshots were taken on a desktop while the researcher was signed out of any Pinterest accounts. Pinterest as a platform can be accessed as an app through devices like mobiles and tablets. Pins are the mode in which images are saved, *Figure 2* shows how an individual pin appears on the Pinterest user interface. It shows the pin with its original source link, the user who saved it (which is in this case the SMG Pinterest account), and some accompanying meta data about the pinned image which will be explored in depth in *Chapter 5 - Automating context: how digital infrastructures facilitate the sharing of museum interpretation through shared digital images*. Several Pinterest suggestion features like the tags accompanying the image (such as 'Animals', 'Dogs') can also be seen, or the 'More like this' section below showing to similar image pins. This user interface feature that automatically grouped and suggested similar or related images was a key feature of Pinterest, as was the ability to scroll through images. Figure 3, although limited to the pins saved to the SMG Pinterest account, shows the pin scroll feature accessed through a desktop. Again, information can be seen as part of each pin, accompanying the image, such as suggested tags, an image title, some descriptive text and the Pinterest account that shared the pin. A key feature of Pinterest, and one studied within this thesis, is the ability to save pins to boards. Figure 4 and Figure 5 show 'Solar-Inspired Gifts' board by the SMG account. Figure 4 is used here as an example of a board that has been curated into different sections, Figure 5 shows the user interface for one of these board sections when opened. Chapter 4 explored further how images have been shared both encountered and shared digitally, it includes further examples that included in the analysed data set of the user interface featuring SMG collection objects. These are illustrative examples to show the how the Pinterest platform interface appears to users in a desktop, the methods below detail collecting and processing raw data from Pinterest.

Figure 2 – Example of Pinterest Pin. Screenshot of Pin featuring "Nipper," a Science Museum Group collection object pinned by the Science Museum Group official Pinterest account. Details for object: Model of ` Nipper'. 1993-866 Science Museum Group Collection Online. Accessed 2 October 2024. https://collection.sciencemuseumgroup.org.uk/objects/co117589/model-of-nipper. Accesses & screenshot taken 2 October 2024 whilst researcher was not logged into a Pinterest account. URL: https://uk.pinterest.com/pin/133771051419354142/. The image cited here has been redacted to prevent copyright infringement.

Figure 3 - Pinterest user interface, example of page of pins, demonstrating pins scroll user interface. Screenshot showings page of pins from the SMG Pinterest account showing Science Museum Group collection objects Accesses & screenshot taken 2 October 2024 whilst researcher was not logged into a Pinterest account. URL:https://uk.pinterest.com/sciencemuseum/_created. The image cited here has been redacted to prevent copyright infringement.

Figure 4 - Example of Pinterest user interface for Boards. 'Solar-Inspired Gifts' Pinterest board created by Official SMG Pinterest account, demonstrating how Pinterest boards can be curated into sections. Accesses & screenshot taken 2 October 2024 whilst researcher was not logged into a Pinterest account. URL: https://uk.pinterest.com/sciencemuseum/solar-inspired-gifts/. The image cited here has been redacted to prevent copyright infringement.

Figure 5 - Example of Pinterest Board section in Pinterest user interface. Showing the "Summer Holiday Prints" from the SMG accounts "Solar Inspired Gifts" Pinterest Board. Accesses & screenshot taken 2 October 2024 whilst researcher was not logged into a Pinterest account. URL: https://uk.pinterest.com/sciencemuseum/solar-inspired-gifts/summer-holiday-prints/. The image cited here has been redacted to prevent copyright infringement.

Pinterest Methods

Pinterest data collection methods focused on the recontextualisation of the SMG collections from its website and collections online web pages within different

Pinterest boards. The key research question for this thesis is: *How are digital images of the SMG's collection (re)used on social media (Pinterest and Twitter) and does this recontextualisation expand on, or provide new understandings of the objects?* The act of sharing a digital image of a collection object is considered as recontextualisation. Digital images of collection objects that are saved or "pinned" to boards are points of data collection, because someone has actively chosen to keep or recontextualise an image. This recontextualisation is the point of study.

The SMG's Pinterest account became a point of data collection to better understand recontextualisation through repinning. Only "organically" shared images saved and repinned by Pinterest users were included in the dataset. These "organically" shared images were images from the SMG collection excluding those shared by SMG itself. Pinning of an object occurs when a Pinterest user saves an image from somewhere on the web to the Pinterest platform, in doing so creating a pin; repinning occurs when they find an existing pin on Pinterest and save it to one of their own boards. The SMG's Pinterest business analytic accounts allow for the tethering of a website. Tethering is the process by which an organization or group's Pinterest account is connected to a website's domain name and consequently analytics of what is shared on the Pinterest platform from that domain name can be gathered. At the time of data collection, the Science Museum's Pinterest page was tethered to the Science Museum website, which linked through to the collections online pages (a subdomain) where the Group's collection could be shared.[219] SMG-generated pins populating their own Pinterest account were not analysed, rather content saved by other users through pinning and repinning.[220] This tethering and filtering

[219] 'What-Is-a-Subdomain-How-i-Can-Access-Subdomain.Png (655×218)' <https://jsmwebsolutions.com/blog/wp-content/uploads/2017/03/what-is-a-subdomain-how-i-can-access-subdomain.png> [accessed 28 July 2021].
[220] SMG generated social media pinned from other social media sites, such as Instagram (SMG instagram account posts saved by other people to their boards) & YouTube (SMG youtube account videos saved by other people to their boards) were collected but not analysed.

through Pinterest's analytics features allowed the acquisition of images pinned from the Group's website and collections that had been saved or repinned by others from the Science Museum website. This dataset was initially collected through SMG's business analytics portal which is a part of SMG's business Pinterest account, this was possible as the researcher had access to the official Group account.

Pinterest analytics allowed for the collection of data on repinning and saving from SMG's website in CSV form. CSV files detailing the 'top 50 pins' of images linked to the Science Museum website were manually collected at regular intervals of a week, a month and 3 months. These time periods were reflected in downloadable options of CSVs for the most shared pins in analytics. The weekly CSVs were analysed as they captured the widest range of SMG collection object pins over the six-month period of data collection. As stated above, analysis focused on saves/pins by Pinterest users other than the Science Museum but saved from the Group's web pages. The following data collection fields (detailed in Table 1) were set up.

Table 1 – Selected Pinterest analytics fields for data collection.

Pinterest analytics collection options	**Selected fields**
Date range	last 7 days
Content types	Organic (organic means non-ad)[221]
Claimed accounts	www.sciencemuseum.org.uk
Devices	All
Source	(Not from you)[222]

This data was collected from Pinterest analytics between 7th May 2019 and 7th January 2020, then data from a six-month period within this from 9th July 2019 to

[221] This means non-promoted or non-advertisement content, it is without paid support.
[222] Changed to "other pins" from 21 June 2019.

7th January 2020 was analysed.[223] Throughout the period of data collection, Pinterest analytics was in a period of beta testing. This meant that some fields had to be collected manually, as available fields designated for collection appeared and disappeared without warning. This need for flexibility and checking of methods is explored in more depth later in this section. Collection of Pinterest data was not solely done through analytics.

Once six months' worth of "top 50" weekly saved pins sourced from the Science Museum website were collected, the data was then supplemented with further pin metadata collected through Pinterest's application programming interface (API). Pin IDs, although not a distinct field, were collected through the pin's individual URL where they are represented as a unique string of numbers that make up the last part of each URL after 'https://www.pinterest.com/pin/', and duplicates were removed. This smaller list of unique pin IDs was then used to make calls on the Pinterest API to gather further data.

The Pinterest API was, at the time of data collection, open for a limited volume of calls per hour for developers. This was done through the researcher's own Pinterest account to ensure the public accessibility of pins. An initial conversation with Pinterest did not lead to enhanced access, so free developer access to their API was used. As suggested by Pinterest,[224] Postman, a collaboration platform for API development, was used to get a developer access token that enabled 10 calls per hour. However, in practice this varied from anywhere between 10 and 100 per hour. Each API call returned metadata in JSON format for a pin containing an SMG collection object, with multiple fields of data.

[223] There are 1350 rows of data in the 6 months analytics downloads period.
[224] 'Pinterest Developers - Getting Started', 2020 <https://web.archive.org/web/20200320030833/https://developers.pinterest.com/docs/api/overview/> [accessed 4 November 2023].

Metadata about pins collected through Pinterest's API facilitated the understanding of how each SMG collection object was being recontextualised on Pinterest. Fields of data that were collected included: 'attribution', 'board', 'counts', 'created_at', 'id', 'image', 'link', 'media', 'metadata', 'note', 'url'. Although not listed in Table 2, 'original_link' was also collected, an essential field for this research as it indicated where the image was sourced from on the SMG websites.[225] Table 2 explains this further.

Table 2 – Data fields from Pinterest API as defined on Pinterest developer's webite 20 March 2020, https://web.archive.org/web/20200320030833/https://developers.pinterest.com/docs/api/pins/?

Pinterest API Attribute	**Description**
id	The unique string of numbers and letters that identifies the pin on Pinterest.
link	The URL of the web page where the pin was created.
url	The URL of the pin on Pinterest.
board	The board that the pin is on.
created_at	The date the pin was created.
note	The user-entered description of the pin.
counts	The pin's statistics, including the number of repins, comments.
media	The media type of the pin (image or video).
attribution	The source data for videos, including the title, URL, provider, author name, author URL and provider name.
image	The pin's image. The default response returns the image's URL, width and height.
metadata	Extra information about the pin for rich pins. Includes the pin type (e.g., article, recipe) and related information (e.g., ingredients, author).

[225] 'Pinterest Developers - Pins', 2020 <https://web.archive.org/web/20200320030833/https://developers.pinterest.com/docs/api/pins/?> [accessed 4 November 2023].

Several tools were employed to make calls to Pinterest's API. Firstly, the Pinterest developer API builder was used to create a token that would return the fields outlined above. At the time of writing, API builder had been withdrawn by Pinterest and was no longer in use, but the developer documentation is archived,[226] showing how it previously allowed the selection of data fields relating to a pin. An access token was then automatically generated to make calls to Pinterest's API, shown here with identifiers removed:

> https://api.pinterest.com/v1/pins/[INSERT PIN ID]/?access_token=[INSERT ACCESS TOKEN]&fields=board%2Ccounts%2Ccreated_at%2Clink%2Cnote%2Coriginal_link%2Cattribution%2Curl%2Cid%2Cimage%2Cmedia%2Cmetadata

Data collection and cleaning for this thesis was undertaken using OpenRefine, an open-source tabular data application which enables the tidying of messy data in different formats and the supplementing of data through APIs.[227] However, because of the limited volume of Pinterest API calls possible with free access, a Python script was written to make more frequent calls to Pinterest's API.[228] Anaconda Navigator was used to run a Juptyter notebook,[229] which employed the terminal to make calls to the Pinterest API. Making the API calls was an automated process using an API token and unique pin IDs and pin metadata was returned in JSON. The Python script for this can be found in Appendix 2 - Pinterest API Python Script run on Jupyter Notebook. The data was collected from 8th April 2020 to 20th April 2020. Although planned as a totally automated process, in

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[226] 'Pinterest Developers - API Explorer', 2020 <https://web.archive.org/web/20200320002348/https://developers.pinterest.com/tools/api-explorer/?> [accessed 4 November 2023].
[227] 'OpenRefine' <https://openrefine.org/> [accessed 28 July 2021].
[228] Martin Steer then Technical Lead at School of Advanced study, wrote this code to ensure that calls were automated to be within free developer access and only make calls to pins sourced from the SMG website.
[229] 'Anaconda Navigator — Anaconda Documentation' <https://docs.anaconda.com/free/navigator/> [accessed 28 July 2021]; 'Project Jupyter' <https://jupyter.org> [accessed 28 July 2021].

practice the script had to be checked regularly as it failed if it encountered a pin that had already been deleted,[230] and had to be manually restarted.

The dataset then comprised of Pinterest data from two sources. Firstly, a collection of the most popular saved pins featuring images from the SMG's websites collected through the SMG's Pinterest business analytics page, and then supplementary metadata on each of these pins collected through Pinterest's API. This dataset was then supplemented with collection object information from the SMG's collection API,[231] which was collected and merged using OpenRefine.

Multiple methods were required to link Pinterest pin metadata to collection object data through original SMG website URLs. This linking was an essential step in understanding how the collection had been shared by users. Although the 'original URL' was included in fields collected from the API, and in some cases, this linked directly back to the collection online object page, this was not the case for all pins. Therefore, further linking methods were employed. A significant number of pins were sourced from a decommissioned subsection of the Science Museum website called 'Brought to Life: Exploring the History of Medicine',[232] a collaboration with the Wellcome Trust, which hosted exclusively medical collection objects. Objects sourced from Brought to Life were linked to current collection pages through a list of internal website redirects implemented when *Brought to Life* was decommissioned.[233] An example process of moving through a sequence of different but connected URLs in order to link past Brought

[230] If this was undertaken again, the script would adjusted to account for this.
[231] 'The Science Museum - Collections Online API', *GitHub* <https://github.com/TheScienceMuseum/collectionsonline/wiki/Collections-Online-API> [accessed 28 July 2021].
[232] '[ARCHIVED CONTENT] Home - Science Museum, Brought to Life' <https://webarchive.nationalarchives.gov.uk/ukgwa/20180801134340/http://broughttolife.sciencemuseum.org.uk/broughttolife/> [accessed 28 July 2021].
[233] Many thanks to SMG Web Architect Jamie Unwin for providing internal redirect list of URLs.

to Life URLs to current SMG collection URLs which were correct at the time of data collection, is detailed below.

Pinterest to SMG collection online record in URLS for *Pachon oscillometer, Paris, France, 1919-1925*

- **Original link from Pinterest pin metadata**

http://www.sciencemuseum.org.uk/broughttolife/objects/display?id=92253

- **Internal SMG redirect**

https://collection.sciencemuseumgroup.org.uk/oid/1980-1381?redirect=true

- **Current (browser) URL**

https://collection.sciencemuseumgroup.org.uk/objects/co94123/pachon-oscillometer-paris-france-1919-1925-sphygmomanometer

- **SMG API URL (which returns JSON)**

https://collection.sciencemuseumgroup.org.uk/api/objects/co94123/pachon- oscillometer-paris-france-1919-1925-sphygmomanometer

In addition to the automated ways of connecting to current online collections URLs, some had to be manually resolved, for example if they were for the museum's homepage URL where the content frequently changes. This group of URLs linked to the Science Museum website contained collection photography, but often the links when clicked resolved to the homepage. To resolve this issue, following close reading of the dataset, a mix of reverse image search using Google Image Search and using vocabulary found in the pin metadata to free text search SMG's collections online was employed to manually find the relevant object in SMG's collection. Following the processes described above, all three groups of original pin URLs – correct SMG collection URL, *Brought*

to Life URL and manually identified URLs – were all linked to the current collection online web pages and calls could be made to the SMG's API to return the desired data.

OpenRefine was used to make calls on SMG's API. Data from GET requests for collection objects was downloaded in JSON and then a GREL script (which can be found in Appendix 2 - Pinterest API Python Script run on Jupyter Notebook) was used to pull specific fields from the object's collection catalogue information from the returned JSON for each object. Postman software was used – specifically the "pretty function" – to see the structure of the JSON files and split out relevant data. Collections catalogue information returned by SMG's collection API in the JSON for each object is detailed in Table 3 below.

Table 3 – SMG collections metadata fields returned in JSON

SMG collection object metadata field name	**SMG collection object metadata field description**
mini-description	Shorter description of collection object
description	Longer description of collection object
credit	Object credit line
type	Internal SMG object categorisation for the kind of object e.g. "photograph", "game", etc.
materials	What the collection object is made of
object number	Unique identifiers for collection objects within SMG, otherwise known as accession number.
category	Internal SMG object categorisation of the collection into subgroupings.[234]
title	Title of the collection object

[234] 'https://collection.sciencemuseumgroup.org.uk/categories', *Science Museum Group* <https://collection.sciencemuseumgroup.org.uk/categories> [accessed 7 March 2024].

The entire JSON available for each collection object was returned by the API, then specific elements were pulled using GREL in OpenRefine. The dataset of original pin IDs supplemented with collection object information from SMG's collection API was then merged into the longer list of weekly saved "top 50" pins to form the final dataset that was analysed.

Further data collection from Pinterest and content analysis was undertaken by the close reading of Pinterest boards that the collected pins were pinned to. This was done at several points between November 2021 and June 2022.[235] All data collection and content tagging were undertaken while not logged into Pinterest so that any results were publicly accessible, and they were viewed through a private browsing tab to negate the impact of any cookies that might affect that browsing experience, in this case content tags. This is a key difference in approach from that taken by existing Pinterest methods which explore content suggestions by being logged into Pinterest as part of their method.[236]

Additionally, algorithmically generated 'similar ideas popular now' board suggestions, if displayed for the board, were collected.[237] The pins that were collected during the above period – that is, when collecting the Pinterest automatically generated content tags – could change over time as the algorithm's recommendation of 'similar ideas' responds to additional information and potentially changes to the algorithm itself. However, the collected data represents an accurate data snapshot at the collection times listed above.

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[235] Modifications to the 'SMG Pinterest Boards' OpenRefine project: it was created 5 November 2021, it was then modified on 31 January 2022, work on the project then started again from: 8 June 2022 – 30 June 2022.
[236] Prof Bodil Axelesson, 'Go Viking: Digitisation, Fans, Re-Enactment and Consumption on Pinterest', in *Digital Futures in and for Heritage* (presented at the ACHS 2020:Futures, 12th August – 8th September).
[237] These were manually collected.

Qualitative content analysis was carried out on the Pinterest boards dataset. Content tags for boards were devised using Gillian Rose's visual methodologies,[238] which built on the work of Lutz and Collins.[239] The coding categories or codes aimed to be: 'exhaustive', with every image covered; 'exclusive', that is, there should be no overlap; and finally, 'enlightening', in that they should be 'analytically interesting'.[240] Coding was undertaken based on the description of the theme of each board and this aimed to be value judgement free and non-object specific.[241] The boards were coded in three themes: subject area theme, type of object and theme not immediately obvious to third party (TNIOTTP).

Many pins were unable to be connected to collection objects because they used legacy URLs which could not be used to make calls to the SMG's Collection API. In addition to wrongly matched *Brought to Life* redirects causing problems with joining pins' original collection URLs to the corresponding new SMG collection URLs API, the presence of older URLs also caused a problem. Some of the pins, although saved/repinned during the period of data collection, had been circulating on Pinterest for around ten years. In this case, 'legacy' URLs are those in the 'http' format that preceded 'https' ('https' uses an encrypted connection and is now the norm).[242] As previously stated, OpenRefine, and moreover a master project in OpenRefine, was used to collate and collect data.

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[238] Gillian Rose, *Visual Methodologies: An Introduction to Researching with Visual Materials*, Fourth edition (SAGE Publications Ltd, 2016), p. 92.
[239] Catherine A. Lutz and Jane L. Collins, *Reading National Geographic* (University of Chicago Press, 1993) <https://press.uchicago.edu/ucp/books/book/chicago/R/bo3697068.html> [accessed 26 July 2022].
[240] Rose, *Visual Methodologies*, p. 92.
[241] Each Pinterest board has its own description, these are set by the Pinterest user who created the board.
[242] 'Why Is HTTP Not Secure? | HTTP vs. HTTPS', *Cloudflare* <https://www.cloudflare.com/learning/ssl/why-is-http-not-secure/> [accessed 28 July 2021].

The OpenRefine built-in API caller could not make the API calls with an 'http' URL string and it only returned html, or rather the html head/envelope. The http URLs had been redirected to https but the redirect was not being processed by the OpenRefine API caller.[243] The redirects were therefore manually bulk processed in OpenRefine by splitting the URL string after http, inserting an 's', rejoining the text and then remaking the API calls. This added an additional process, on top of changes to the platform and business analytics page during data collection, to connecting digital images of collection objects to their museum source. These kinds of changes cause a break with source context and make it difficult for Cultural Heritage organisations to keep track of how their collections are being used and re-contextualized.

Following the above processing, there remained pins in the dataset that did not have any SMG collections metadata gathered by SMG's collection API. This was because either the Pinterest pin or board had been deleted, in which case the pin was removed from the dataset to respect the Pinterest user's wishes to remove it from public space and to adhere to Pinterest terms of service. However, there were also pins that were still live that could not be linked to SMG collection objects in the way that other pins were manually linked using the processes described above. This was because the image was sourced from the shop website; the science museum blog; a 'person' page in SMG collections online; the SMG homepage; a beta version of the Science Museum site;[244] or just links to 'page not found' in collections online. Furthermore, there were a handful that linked through to a collection object which, as even collections become a shifting target with redirects, may not have been live at the time of collection object API processing.[245]

[243] Thank you to Jamie Unwin for assistance with this. 25 January 2021.

[244] beta.sciencemuseum.ac.uk

[245] A couple in the sample of 30, taken from the 72 pins that do not have accompanying information.

Data cleaning was largely done in OpenRefine, with a "master" project used as the main point of reference for collected and processed data from the Pinterest dataset. The master OpenRefine project had data collated from the different sources that make up the Pinterest dataset: weekly saves of information from the Pinterest Analytics data pulled from SMG's business Pinterest analytics portal, pin metadata collected from the Pinterest API,[246] and SMG collection object metadata collected through the SMG collection API. Data was processed either in separate OpenRefine projects or in an Excel spreadsheet before being pulled into the master project through using unique identifiers. The main unique identifier used across these Excel files and OpenRefine projects was the Pinterest pin ID, this is a unique number that every pin is assigned by Pinterest. Excel transforms long strings of numbers and for this reason, at times the full Pinterest URL was used instead of the pin ID number. The other unique identifier used was SMG collection object number.

Some functionality to analyse data was not possible in OpenRefine, so additional software including Excel was used. Saves or pinning made during the period of data collection have been considered a key metric as they are more reliable than the "total pin saves" metadata field and are specific to the period of data collection. These values were calculated using Excel. Excel has data cleaning and processing functionality that OpenRefine does not possess, such as pivot tables,[247] and these were employed, with unique identifiers being used to reconcile data later. Specifically, pivot tables were used in Excel to analyse particular aspects of the dataset such as weekly saves by object number and weekly saves by Pinterest pin ID.

[246] These API calls were made using Python and a Jupyter notebook.
[247] Microsoft, 'Create a PivotTable to Analyze Worksheet Data - Microsoft Support' <https://support.microsoft.com/en-us/office/create-a-pivottable-to-analyze-worksheet-data-a9a84538-bfe9-40a9-a8e9-f99134456576> [accessed 26 July 2022].

Graphs were used as a tool to visually represent and analyse data. Specifically, RAWgraphs.io was used.[248] RAWgraphs is a tool accessible through a web browser that allows the user to input data in several formats and produce a variety of graphs. RAWgraphs does not store data, and although the application is provided remotely, all data is executed locally meaning that datasets remain private.[249] The methods for generating each graph and the resulting findings are explored in Chapters 3 and 4.

Methods for digital ephemerality

The method for data collection outlined above was developed and evolved throughout this research. The field notes that were taken as part of the process for collecting data from the analytics and API have become an invaluable record of how much these sources changed throughout the period of data collection. Throughout the course of data collection, the Pinterest analytics page was in beta testing. The Pinterest API was announced to be deprecated just before data collection began and even the SMG decided to make changes to the setup of its Pinterest page. Digital data collection methods need to be frequently revisited to check relevance and viability, including during the period of data collection. Even as this thesis was being written up, it was no longer possible to undertake all aspects of data collection outlined here.

The Pinterest business analytics page was going through a period of beta testing throughout data collection. The first effect of this was the loss of fields from the CSV files that could be downloaded. As previously mentioned,

[248] 'RAWGraphs 2.0' <https://app.rawgraphs.io/> [accessed 26 July 2022].
[249] 'RAWGraphs | Proceedings of the 12th Biannual Conference on Italian SIGCHI Chapter' <https://dl.acm.org/doi/10.1145/3125571.3125585> [accessed 25 July 2022].

downloading from the analytics page was a partially manual process, in terms of selecting fields for inclusion and downloading the CSV each time. However, when key fields such as the original URL that sources the image on the Science Museum website were no longer selectable as part of the CSV download, they then had to be collected by navigating through the platform. Sometimes these fields were replaced by others, for example '10 second views' replaced 'saves' for a month around July and August 2019. When planning data collection, it was possible to click into a pin and see which boards it had been saved to, but this function had been removed by the time collection started. This meant that when building a data collection strategy, whether automated or manual, attention had to be paid to what was being collected. Designing a primary data collection process does not mean that it will continue to be viable, or return all the desired fields, over the course of even a six-month period.

It is no longer possible to undertake the data collection method outlined in this section because Pinterest has changed its API. Pinterest posted a notification on its developer pages about API deprecation in April 2020. The notification said that the API was to be replaced with more 'robust endpoints'.[250] This has meant the loss of the API explorer builder as part of the developer web pages, meaning that the API is less accessible. There are manual methods that still exist, but Pinterest has followed other social media platforms such as Facebook and Instagram in increasingly restricting the functionality of its APIs available to external parties, affecting the research methods that can be undertaken. This is not unique to this thesis, and the need to be mindful of working with digital images as ephemeral research material has been noted by other researchers: 'a platform may disappear (as Myspace did), or an API be discontinued (Rogers, 2015).'[251] The ephemerality of data collection sites

[250] 'Pinterest Developers - Getting Started', 2020 <https://web.archive.org/web/20200421032039/https://developers.pinterest.com/docs/api/overview/?> [accessed 7 November 2023].
[251] Rose, *Visual Methodologies*, p. 303.

highlights the challenges for digital humanities researchers when working with third party data, platforms and software.

Modifications to data collection channels did not only come from changes to the Pinterest platform. In October 2019 in a move to make their social media channels a more consistent Group presence, SMG planned to change the Science Museum Pinterest page to be an SMG branded account. If this had happened, it would have taken place in the middle of data collection. The Science Museum iteration of the Pinterest page linked through to its collections online website and therefore the wider Group's collections. Changing the site to which pages were tethered could have had unknown effects on how pins that had previously been pinned were showing up in Pinterest analytics. The name and logo of the Pinterest page were changed during the period of data collection, but the site was still tethered to the Science Museum website throughout the data collection period. Changes therefore have arisen from the Group's alterations to the site of study, and not only from the social media platforms that primary data was collected from.

Platform changes during the course of the research were not only limited to Pinterest; Twitter also went through considerable changes. Although they did not take place during the period of data collection, there were major alterations to the platform and API access during the time of the thesis. As already noted in the Introduction, Twitter was sold to Elon Musk on 28 October 2022.[252] There had been changes to the platform before this, for example when Twitter enabled access to historical tweets for researchers in January 2021,[253] but following the

[252] Dan Milmo and others, 'Elon Musk Completes Twitter Takeover amid Hate Speech Concerns', *The Guardian*, 28 October 2022, section Technology <https://www.theguardian.com/technology/2022/oct/28/elon-musk-twitter-hate-speech-concerns-stock-exchange-deal> [accessed 11 November 2023].
[253] Nick Statt, 'Twitter Is Opening up Its Full Tweet Archive to Academic Researchers for Free', *The Verge*, 2021 <https://www.theverge.com/2021/1/26/22250203/twitter-academic-research-public-tweet-archive-free-access> [accessed 7 November 2023].

Musk acquisition, the API was closed to researchers completely on 9 February 2023.[254] Fortunately, as the Twitter data collection for this project was undertaken prior to these larger platform transformations, and the chosen research methods were largely unaffected. Captures of tweets identified as notable through data analysis were made using Conifer,[255] to preserve a version of the Twitter user interface before acquisition by Musk. This mitigated against subsequent changes to branding, design and functionality as what was "Twitter" morphed into the platform known as "X" at the time of writing.[256]

Twitter

The Twitter platform has specific features for users to interact with. As noted above, at the time of data collection Twitter had not yet become "X" therefore user interface examples show the platform before this change. During data collection it was not necessary to have an account to access Tweet information, therefore all the examples seen below (Figure 6, Figure 7, Figure 8) prompts from Twitter asking the user to sign in can be seen. These screenshot examples show desktop versions, specifically safari, of the Twitter user interface. However, it was also possible to access Twitter through an app on mobile phones or other devices such as tablets. Examples from the Science Museum's twitter have been used here as an example to show platform functionality, although the focus of thesis is not content originating from SMG. The interface for the landing page of Science Museum's verified twitter account profile page can be seen in Figure 6. This thesis focuses on tweets, Figure 7 shows how the tweet would appear to those visit the

[254] Jenae Barnes, 'Twitter Ends Its Free API: Here's Who Will Be Affected', *Forbes*, 2023 <https://www.forbes.com/sites/jenaebarnes/2023/02/03/twitter-ends-its-free-api-heres-who-will-be-affected/> [accessed 7 November 2023].
[255] 'Conifer', *Conifer* <https://conifer.rhizome.org> [accessed 11 November 2023].
[256] Dan Milmo and Dan Milmo Global technology editor, 'Elon Musk Reveals New Twitter Logo X', *The Guardian*, 24 July 2023, section Technology <https://www.theguardian.com/technology/2023/jul/24/elon-musk-reveals-the-new-twitter-logo-x> [accessed 11 November 2023].

platform; it is possible to see the account that sent the tweet, the tweet text containing any links or emoji's, any image(s) the tweet contains, when the tweet was sent, from what device it originated and finally how many times it has been liked, retweeted or commented upon. At the time of data collection, the 'ALT text' image descriptions feature was not in use,[257] however you can see it as a function in Figure 7. Twitter also had a function for searching specific words or hashtags in tweets as can be seen in Figure 8. Trending hashtags can also be explored through the search of Twitter's interface shown in Figure 8, here the specific search term "#SMLates" has been used to show how this would be used within the interface. These captures are static screenshots and also taken when not logged into a Twitter account, therefore the Twitter thread, a personalised scroll of tweets from accounts you follow has not been represented here. These user interface show how Twitter as a platform would have been encountered through the user interface, but the methods employed in this thesis have worked with the same raw tweet data but through a different research data pipeline detailed below.

Figure 6 - Example of Twitter user interface for an individual user profile, here Science Museum's profile is shown. Captured through Conifer on 18 November 2022, this was captured on Safari desktop browser whilst signed out from Twitter. The image cited here has been redacted to prevent copyright infringement.

[257] Twitter Product, 'We're Making Images on Twitter More Accessible. Here's How', 2022 <https://blog.x.com/en_us/topics/product/2022/making-images-twitter-more-accessible> [accessed 4 October 2024].

Figure 7 - Twitter user interface example for a Tweet. Science Museum Tweet example from 18 November 2022. Captured through Conifer on 18 November 2022, this was captured on Safari desktop browser whilst signed out from Twitter. The image cited here has been redacted to prevent copyright infringement.

Figure 8 - Example of Twitter search using search bar and a hashtag, specifically here #SMLates. Showing the user interface for Twitter search, here we see it is set to "Top" for searching tweets, you would be able to scroll down from here. Captured through Conifer on 18 November 2022, this was captured on Safari desktop browser whilst signed out from Twitter. The image cited here has been redacted to prevent copyright infringement.

Twitter Method

A mix of qualitative and quantitative methods were used for the Twitter dataset. Although the scraping part of the process for primary data collection was automated and could be considered quantitative, many qualitative analysis techniques were employed. The Twitter dataset is too small to be considered 'big data' and consequently lends itself to the qualitative methods such as embedding and close reading of datasets that were employed. As a collaborative doctoral candidate, the researcher was embedded within the SMG for the period of the PhD. To inform data collection, internal SMG social media team meetings were attended, and social media managers across the Group were contacted via email to stay abreast of consistently used SMG hashtags, which were used to inform collection. Once the period of Twitter data collection was complete, the hashtag and handle datasets were kept in the 'bins' they were collected in and cleaned through close reading, query bins being a way to filter and sort datasets in the Twitter Capture and Analysis Toolset (TCAT).[258] Introduced in detail below. Once the bins were cleaned and a dataset of images was left, the downloaded images were reviewed individually by the researcher to identify those which contained collection objects. The method for data collection and cleaning in this way moved between automated quantitative and close-reading qualitative.

TCAT was used to scrape and collect Tweets. A software toolset for capturing and analysing tweets was developed by the Department of Media Studies at the University of Amsterdam. In making the toolset and writing about its production, Borra and Rieder explore the methodological consequences of designing and using a particular toolkit, as the '[…] encounter between technology and methodology … deeply affects the status and practice of

[258] Borra and Rieder.

research [...]'.[259] TCAT was designed for researcher flexibility around method use, and for this reason worked well with the mix of quantitative and qualitative approaches adopted here. For this thesis, TCAT software was used to aggregate tweets using specific search terms. Only tweets containing consistently used SMG handles and hashtags were collected. This was undertaken through use of the Twitter API 'statuses/filter endpoint',[260] an API request that allows for calls with specified parameters (i.e. a Twitter handle) to be made and return tweets with matching text strings. This 'statuses/filter endpoint' is built into TCAT and used to be able to "track" and live collect tweets containing specific keywords.[261] This live collection was necessitated by use of TCAT and the standard Twitter API. It shaped the thesis data collection methods as it was only possible to *live collect* tweets into bins. Data collection was undertaken from June 2019 – February 2020, and the six-month period from 18 June 2019 - 18 December 2019 was reflected in the datasets that were analysed. TCAT was installed and run on university computers at the School of Advanced Study, University of London. The TCAT software returns aggregated Twitter data in CSV file format, which can be a limitation, especially when the primary sources that are the focus of study were digital images. These are not aggregated by the software, but Tweet ID and image URL reference the online images. Tweet CSV exports of the bin datasets were then cleaned in OpenRefine. TCAT has some basic sampling, analysing and network functionalities but these were not employed in this thesis.

Tweets have specific features as digital objects. There is a difference between the tweet that Twitter users encounter on their thread in the user interface, and the form that tweets take when scraped through the Twitter API, although they both rely on the same source data.[262] As TCAT was employed to aggregate tweets, their JSON form – the format returned by the API – was not

[259] Borra and Rieder, p. 262.
[260] Borra and Rieder, p. 267.
[261] "https://dev.twitter.com/docs/api/1.1/post/statuses/filter"
[262] Kerchner and Wrubel.

engaged with.[263] The nature of the collection object as a tweet and digital object will be explored theoretically in later chapters, but it is worth addressing here what data the tweet is made up of as a digital object for collection, cleaning and analysing. The nature of the tweet as a digital object influenced method. The data downloaded from TCAT for cleaning and analysing was in the form of metadata in a CSV file. The images were not in the original dataset, rather they referenced URLs within the metadata that were part of the dataset. The way that tweets are encountered and experienced by users are different from the tabular metadata that makes up the dataset, but having it in this form makes data processing possible. There were 50 fields of data captured for each tweet.[264] Not all of these were populated for each tweet and some, but not all, would have been seen by Twitter users encountering the tweet through their Twitter feed. Working with the data fields of the tweet, or elements of the digital object, as plain text make processing and analysing the data through tools such as OpenRefine possible.

Only tweets containing consistently used SMG hashtags and handles were collected. (See ethics section earlier in chapter for detailed introduction to data collection methods.) Twitter handles for the SMG include the museums in the Group and separate ones for departments like conservation; hashtags include those consistently used by the museum to promote a particular programme or exhibition and other event hashtags. The table below details all of the hashtags and handles collected, and their start and end date of collection if

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[263] 'Tweet Object' <https://developer.twitter.com/en/docs/twitter-api/v1/data-dictionary/object-model/tweet> [accessed 1 June 2019].

[264] Tweet attributes aggregated from the Twitter API by TCAT: Id, time created_at, from_user_name, text, filter_level, possibly_sensitive, withheld_copyright, withheld_scope, truncated, retweet_count, favorite_count, lang, to_user_name, in_reply_to_status_id, quoted_status_id, source, location, lat, lng, from_user_id, from_user_realname, from_user_verified, from_user_description, from_user_url, from_user_profile_image_url, from_user_utcoffset, from_user_timezone, from_user_lang, from_user_tweetcount, from_user_followercount, from_user_friendcount, from_user_favourites_count, from_user_listed, from_user_withheld_scope, from_user_created_at urls, urls_expanded, urls_followed, domains, HTTP status code, media_id, media_urls, media_type, media_indice_start, media_indice_end, photo_sizes_width, photo_sizes_height, photo_resize, mentions, hashtags

linked to a short-term exhibition or event. It also notes which museum in the Group the hashtag or handle was affiliated with at the time of collection.

Table 4 - consistently used SMG hashtags and handles collected, by museum and date.

Museum in Group	Handle or hashtag	Start date of collection	If temporary dates of exhibition
The Science Museum, London	@sciencemuseum	17 October 2018	
The Science Museum, London	@SM_learn	18 June 2019	
The Science Museum, London	@SM_Conservation	18 June 2019	
The Science Museum, London	#sciencemuseum	17 October 2018	
The Science Museum, London	#ArtOfInnovation	18 June 2019	25 September 2019 – 26 January 2020
The Science Museum, London	#driverless	18 June 2019	12 June 2019 – October 2020
The Science Museum, London	#sciencecity	18 June 2019	
The Science Museum, London	#SMLates	31 July 2019	Last Wednesday of every month 26 June 2019 31 July 2019 28 August 2019 25 September 2019

			27 November 2019
The Science Museum, London	#Topsecret	Back dates using tweet arch to 10th July. Bin set up from 17 July	10 July 2019 – 23 February 2020
The Science Museum, London	#setyoursummerfree	19 September 2019	
The Science Museum, London	#whoamIwednesday	12 August 2019	
The Science Museum, London	#DriverlessThursday	16 August 2019	
The Science Museum, London	#Flightfriday	16 August 2019	
The Science Museum, London	#SpaceSaturday		
The Science Museum, London	#MedicineGalleries	12 November 2019	
The Science Museum, London	@learningSMG	11 November 2019	
The Science and Industry Museum, Manchester	@sim_manchester	17 October 2018	
The Science and Industry Museum, Manchester			
The National Railway Museum, York	@railwaymuseum	18 June 2019	
Locomotion, County Durham	@LocomotionSHD	18 June 2019	

The National Science and Media Museum, Bradford	@mediamuseum	18 June 2019	
The National Science and Media Museum, Bradford	#HelloU	18 June 2019	19 July 2019 – 22 January 2020
The National Science and Media Museum, Bradford	#AbovetheNoise	18 June 2019	Closed 19 June
The National Science and Media Museum, Bradford	#BradSciFest	Back dated using tweet arch 22 July 2019	19–21 July 2019

Not all consistently used SMG hashtags that were live at the time of data collection were captured in the dataset. They were not collected for several reasons including: they were only used by the social media team in Science Museum London,[265] they were for exhibitions that contained no collection objects,[266] they were hashtags seeking to engage audiences in a wider Twitter conversation,[267] or they were not specific enough and contained a lot of non-SMG content.[268] SMG social media managers, or those who tweeted on behalf of the museums, have a preference for "organic" hashtags that flow with the wording of the tweet,[269] rather than hashtags wholly unique to the SMG. This resulted in

[265] #whoamIwednesday, #topsecrettuesday, #MMWMonday
[266] #OneBillionJourneys - National Railway Museum and #powerup - Science and Industry Museum
[267] TBT or OTD
[268] #Lates used by Media Museum Bradford was not collected because it was a hashtag that was used more generally.
[269] Internal meeting attended by researcher.

some datasets not being collected because they were too general and others needing extensive cleaning as non-SMG tweets got included in the dataset.[270]

'Bins' were cleaned individually to preserve context and to facilitate data cleaning by close reading in OpenRefine. This method did result in some doubling up of tweets; if a tweet contained more than one specified SMG hashtag or handle, they were collected by more than one bin. These were removed in the aggregate stage of data cleaning (detailed later), but importantly, it kept the context of the hashtag or handle so that cleaning through close reading of tweets could be undertaken. Cleaning started by removing tweets that did not contain images. The 'media_urls' metadata field was used to filter these. Tweets that remained in the dataset were further cut down using the facet feature in OpenRefine to star/flag any rows that were not relevant before removing them. For example, in '#sciencecity' there were several tweets paying tribute to the founder of a science city who passed away, and these tweets were identified and removed. In the '#driverless' bin the forbes.com domain was linked to 233 times. These tweets linked to two articles about flying or autonomous vehicles,[271] and did not directly reference the exhibition so were removed from the dataset. In this way metadata fields like 'hashtag' and 'domain' were useful for cleaning the datasets. Once the tweet bins had had an initial clean, the next step was to look at the media URLs using a private or incognito browsing window to examine what was relevant and should be downloaded to be part of the dataset. The focus was not on images that came from the SMG accounts, but rather images that originated from outside SMG.

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[270] #medicinemonday was not collected because the hashtag was used in a lot of non SMG content.

[271] Jim Gorzelany, 'One Day You Could Be Driving A Flying Porsche', *Forbes* <https://www.forbes.com/sites/jimgorzelany/2019/10/10/one-day-you-could-be-driving-a-flying-porsche/> [accessed 19 September 2021]; Jon Markman, 'Real Autonomous Cars Hit The Road In Arizona', *Forbes* <https://www.forbes.com/sites/jonmarkman/2019/11/23/real-autonomous-cars-hit-the-road-in-arizona/> [accessed 19 September 2021].

Some hashtags and handles that were collected did not contain tweets with digital images of SMG collection objects, therefore the final list of bins and the number of images in them are below.

Table 5 - Final list of tweets collected by hashtags and handles and the number of digital images in each.

Bin	Number of digital images
HelloU	3
LocomotionSHD	92
Mediamuseum	47
MedicineGalleries	15
Railwaymuseum	306
Sciencecity	4
Sciencemuseum	220
SIM_Manchester	42
SM_Conservation	1
SMLates	17

These cleaned datasets were then used to scrape the images in the tweets. As the dataset was in tabular format in OpenRefine, the digital images it contained needed to be accessed so that they could be analysed. Using a Python script that made WGET requests using the 'media_urls' data for each tweet, the digital images from the above datasets were downloaded and aggregated. These images were then analysed through the process of 'coding'.

Tweet images were collected separately, augmenting the plain text Twitter data, and analysed by employing a number of different software tools. OpenRefine is a powerful tool for processing data, but it does not support image files. Therefore, images were collected and processed through a mix of image file management and data processing in OpenRefine. The tweet images were

scraped using a Python script which can be found in Appendix 2 - Pinterest API Python Script run on Jupyter Notebook,[272] and they were then saved to the researcher's personal computer. Close reading of these images, which were organised following structure of the individual TCAT bins, was then undertaken by the researcher to identify if the images depicted SMG collection objects. The images that potentially did were further inspected and manually tagged with codes devised by the researcher (these are explained further below in *Processing images*). This was a further process of refining, as non-collection objects were removed and deleted tweets were also removed from the dataset. The remaining Twitter dataset images were coded in Excel using unique tweet image IDs as identifiers, and this text-based data relating to the digital images was imported into OpenRefine for analysis. That coded document of unique tweet image IDs was then merged with the data from the original downloads from TCAT (a combined document of all the TCAT 'bin' downloads was created using the terminal to combine the individual CSV files) to create a master project in OpenRefine.[273]

This thesis has been committed to producing a replicable data processing and analysis pipeline, and to this end, methods were conceived with later application by a third party in mind. In doing this, an error in earlier processing was discovered when trying to make sure the pipeline was fit for tweets that contained multiple images. Bins that had multiple photos of collection objects after the initial cleaning were 'SIM_manchester' and 'Topsecret'.[274] Due to the

[272] Many thanks to Martin Steer for his assistance in writing the script.
[273] Columns from the Twitter tagging/coding doc were then merged into the Master Twitter OpenRefine project using the Media Image UI as a merge field. The JSON script for this action was generated and used on the 'Media Image UI' 1,2,3 columns, it was through running this script that a problem with tweets containing multiple images was found. OpenRefine became a useful data wrangling tool here with features like cluster and trimming white spaces, etc.
[274] It was possible to see what had multiple photos in OpenRefine using either Text filter with ";" which was the delimitator between tweet image URLs in the 'media_urls' field of data, or looking at the 'media_type' column to see which rows/tweets had multiple photos listed.

limited number of tweets – 28 in 'Top Secret' and 139 in 'SIM Manchester' – 'SIM_Manchester' was spot checked to understand if a large quantity of multiple images in a tweet depicted collection objects. The tweets with multiple images in 'SIM_Manchester' were found to largely not contain images showing SMG collection objects.[275] As this was identified during the late stages of data processing, and to ensure uniformity across bins, these tweets were not aggregated and analysed as part of the thesis. This approach not only allowed for uniformity when analysing tweet images across the different SMG hashtags and handles, but also strengthened the analysis of recontextualisation by making it certain that the tweet data only related to one image. Each tweet contained a single JPEG and in this way the text and metadata from that tweet formed the context for each of those digital images. Additionally, the dataset was collected using methods that were informed by contextual integrity, i.e. tweets were only collected if they contained SMG hashtags and handles. Consequently, the Twitter dataset was not a comprehensive reflection of all tweets shared containing collection objects at that time, even before this further honing step of excluding tweets that contained multiple digital images.

Methods for critically approaching digital images

This thesis builds on Gillian Rose's image methodology framework for critically approaching digital images. The hope is to add to discussions on digital methods. The methods used here were a mix of quantitative and qualitive and are not purely digital methods as defined by Rose.[276] Digital primary data and methods have been used but not exclusively.

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[275] The findings from spot checking in multiple image 'SIM_Manchester' tweets from the dataset: some images had been deleted, some images showed groups of people, some were of the building, some showed events in rooms at SMG without collection objects, or they were of 'atmospheric memory' an exhibition which did not contain collection objects. There were a couple of images in the spot checking that did contain collection objects.
[276] Rose, *Visual Methodologies*, pp. 288-306,291.

The mixed methods applied here, building on Rose's visual image framework, were employed to understand digital images as they are found on the platforms of study for this research. The framework was applied differently depending on the site of circulation. The content analysis method for analysing visual images involved 'a number of rules and procedures that must be rigorously followed' as originally a quantitative method developed for text.[277] Content analysis was applied to the Twitter dataset to understand the types of digital image that were shared from the SMG collection objects. Content analysis was not used for the Pinterest dataset as this had uniform style of museum object collection photography since the images were sourced from the Group's websites; rather this style of photo is explored through the lens of materiality. Both datasets were matched to the collection object they depict.

Digital images are sources that can be approached critically from multiple entry points in their lifecycle. Rose presents a matrix for understanding visual materials, which breaks the possible interpretation of visual materials in to critical "sites" and "modalities". Sites of images are conceptual and physical moments in the images' lifecycle. Dividing one image into these different sites allows for thinking critically about what happens to it in each. The sites are production, the image (the image itself), circulation, and audiencing.[278] In the matrix these then intersect with 'aspects' present in the images, called modalities by Rose [see figure 1]. The technological modality of an image relates not only to the technology used to create the image, but also to its display and the ways in which it travels.[279] The compositional modality is used to analyse 'specific material qualities' of the site of study.[280] Then the 'range of economic, social and political relations, institutions and practices that surround an image

[277] Rose, *Visual Methodologies*, p. 85.
[278] Rose, *Visual Methodologies*, p. 24.
[279] Rose, *Visual Methodologies*, p. 25.
[280] Rose, *Visual Methodologies*, p. 25.

through which it is seen and used' are investigated.[281] In this thesis, the digital image is part of the user/visitor being an audience for the collection object. This is the starting point for the digital image: as an artefact of the collection object audiencing process. Taking and sharing a digital image in the sites of the museum has also been framed as part of the process of interpreting and remembering that was seen by art education researcher Adam Suess.[282] As defined by Rose, 'Audiencing' is about reception where 'meaning [can be] renegotiated, or even rejected, by particular audiences watching in specific circumstances.'[283] Therefore, it is more than simply a point of reception.

Figure 9 - Rose's visualisation for intersecting sites and modalities (Rose, Visual Methodologies, 2016, pg 25). The image cited here has been redacted to prevent copyright infringement.

There are limits to the methodology of this thesis. In this thesis, it is difficult to speak decisively of the audiencing of the digital image, in the way outlined by Rose. The methods employed in this thesis that focus on the public spaces of the internet do not collect adequate data to do so. There is metadata that relates to the audiencing of the images, but this remains limited without further qualitative research. The way that data collection was undertaken for this project does not lend itself to deep investigation of the audiencing of the images. Instead, the thesis aims to address how digital images

[281] Rose, *Visual Methodologies*, p. 26.
[282] Suess.
[283] Rose, *Visual Methodologies*, p. 38.

of collection objects are being (re/de)contextualised through sharing, and therefore data collection reflects this. Consequently, digital images here can be better understood as being part of social media as a cultural text,[284] to understand the reception and interpretation of the museum collection objects.

Analysing the site of production of an image addresses how that digital image has been made, as well as social factors such as who it was made by, who it was made for and why (see above Figure 9). Although Rose is keen to point out that this approach has gone out of favour as a theoretical approach in recent years, as ways of understanding the impact of an image beyond the maker's intentions have begun to be employed (for example, the relation to other images),[285] the research methods for this thesis have been designed to address how a digital image has been made, building on the understanding of digital images as accessible technology. In Rose's work, understanding how the technological modality intersects with being a site of production can therefore be a point of entry to explore digital images. This is especially true for the Twitter dataset where the images are those taken by visitors to the physical sites of the museum, on their personal devices (digital camera/camera phone). The genre of photos explored in the Pinterest dataset is mainly that of "object photos". This is true to a lesser extent with the Twitter data, which includes images taken either by the museum visitors or by the museum itself, whereas museum-produced images of objects almost exclusively make up the Pinterest dataset. The nature of museum images – object images generally produced with a uniform approach – is explored further in Chapter 4, as part of an image-making tradition. However, some digital images, namely those shared through Twitter, belong to different genres of photography such as selfie, meme, group shot or installation shot. These images are separated into genres, not just by platforms, to critically examine their production.

[284] Naomi Wells, 'Researching Social Media in the Digital Humanities' pre-print.
[285] Rose, *Visual Methodologies*, p. 32.

This thesis considers metadata as part of the digital image. As an object, the visual image is not considered separate from the metadata that both describes it and interacts with it. Digital image metadata has been a key site of collection and enquiry for primary data. Rose is clear on the importance of metadata;[286] she describes its ongoing and evolving production through different interactions and devices:

> Thus, an image's metadata can be created by the device that created the image, and it can also be created by subsequent things that are done to the image - by Twitter's software [...] but also for example by you when, after you've tweeted it, you add a tag to that photo in the application you use to organise your digital photo collection on your desktop computer.[287]

Metadata creation is ongoing and evolving, arising from different audience interactions, at different times, through different devices. It is derived from either the person who created the photograph, the person who posted it or the subsequent people who have interacted with it. Metadata is a constantly evolving part of the 'production of the image' that sits between production and audiencing.

Rose posits social media platforms as sites of circulation.[288] The site of circulation for digital images is a conceptual tool, between the sites of 'production' and 'audiencing.[289] This thesis will employ it in the same way as Rose.[290] The shareability of these digital photos – they are posted to platforms where they are retweeted or repinned and consequently seen by more people, but still conceptually stem from that original pin, tweet, online collection object – means the conceptual site of circulation is a key locus of enquiry for this thesis. A

[286] Rose, *Visual Methodologies*, p. 293.
[287] Rose, *Visual Methodologies*, p. 294.
[288] Rose, *Visual Methodologies*, pp. 36–37.
[289] Rose, *Visual Methodologies*, p. 34.
[290] Rose, *Visual Methodologies*, p. 35.

key question and site of study for this thesis will be how are the digital images circulated?

Metadata is an important part of the primary dataset for understanding the conceptual space of circulation as described by Rose. When discussing circulation as a site, she adopts a broad understanding of technology and then describes diverse *'technologies'* responsible for circulation:[291] 'Digital images in particular are always mediated by a complex range of software and hardware, in their production but also their circulation (and display).'[292] When discussing digital methods, Rose makes clear the importance of metadata.[293] Using metadata can facilitate digital methods, although the method I have outlined here is not purely 'digital' in the way Rose describes digital image methods. There is huge value in counting and considering metadata as part of the *whole* of the digital image.

Metadata is a rich resource for understanding processes enacted on digital images shared through social media, and this thesis employs digital methods as a way of interrogating that data. Metadata included as part of the digital image is descriptive of the processes that it has gone through; as a generative process, the metadata describes what has happened to the digital image but also affects what will then happen to it. Existing likes and saves for a post affect where it will be seen next, as they are likely factors in algorithmic promotion of content on the platforms of study. Algorithms and machines, as well as people, thus make up the audience for digital images.[294] A key question for understanding circulation is the concept of organisation: who or what have the digital image(s) been organized by? Why have they been organised that way? Platform algorithms, which are often opaque in structure and therefore

[291] Rose, *Visual Methodologies*, p. 35.
[292] Rose, *Visual Methodologies*, p. 35.
[293] Rose, *Visual Methodologies*, p. 293.
[294] Rose, *Visual Methodologies*, p. 303.

behaviour, function effectively as 'black boxes'.[295] Their structural role in social media platforms 'shapes' the sharing of content.[296] Metadata is important primary data, but it can also seen as cultural text and that is why this thesis has not employed purely digital methods. Finally, Rose notes that, '[t]he circulation of an image may also affect its compositional quality.'[297] There are questions for the site of circulation in terms of the composition of the image, discussed as a composite of the digital image and metadata.

The site of the image is where the image makes its own meaning, through visual effects or social meanings expressed visually. However, Rose suggests that the most important way that this can happen is through compositional modality. She cites the work of art historians John Berger and Griselda Pollock when she discusses the 'organisation of its [a photograph's] formal qualities', asserting that it is here that the meaning in the composition and content of the photograph is found.[298] Their work analyses the composition of photography and how it intersects with social meanings found in that composition. Of course, the latter is shifting and contextually specific (see site of audiencing) but understanding the composition of photos is vital.

Content analysis is a quantitative method for understanding large quantities of images[299] and has been employed in this thesis to evaluate the digital images from Twitter and Pinterest. It is an approach that has already been employed as a method for working with digital images shared through social media of museums and their collections,[300] and sits within compositional site

[295] Bonacchi and Krzyzanska, p. 1236.
[296] Rose, *Visual Methodologies*, p. 35.
[297] Rose, *Visual Methodologies*, p. 37.
[298] Rose, *Visual Methodologies*, p. 33.
[299] Rose, *Visual Methodologies*, p. 104.
[300] Budge, p. 74; Arias; Suess.

and modality.[301] Content analysis involves the development of a coding system, specific to the dataset being processed. As a method it, 'offers a clear way for engaging systemically with large numbers of images.'[302] Rose largely builds her method for coding digital images on an analogue example of the photographic coding work done by Lutz and Collins in their study of National Geographic photographs. In content analysis a rich dataset is reduced to codes, meaning patterns can be found that would not have otherwise been found in a smaller dataset.[303] In contrast to compositional interpretation, 'Content analysis is methodologically explicit.'[304] Using content analysis in this research meant devising categories to code the Twitter dataset with. These were designed to be valid and replicable.[305] When using content analysis categories or codes, as noted above, Rose suggests they must embody the three Es: they must be 'exhaustive', such that every image can be covered; 'exclusive', with no overlap; and 'enlightening', generating an insightful analytical contribution.[306] The content categories devised for this project were informed by digital ethnographic work already undertaken on understanding social media platforms, as well as primary work within the sites of the SMG to understand collection photography. This is in the spirit of Lutz and Collins whose theoretical concerns informed their categories, resulting in a quantitative and qualitative analysis of their data.[307] As stated earlier, this thesis employs a mix of quantitative and qualitative methods in analysing digital images. Although content analysis is a quantitative method, that does not mean that it cannot be used in conjunction with qualitative methods. Indeed, Kippendorf suggests that quantitative and qualitative methods coming together can enable understanding of the symbolic value of the composition of a digital image.[308]

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[301] Rose, *Visual Methodologies*, p. 104.
[302] Rose, *Visual Methodologies*, p. 102.
[303] Rose, *Visual Methodologies*, p. 87.
[304] Rose, *Visual Methodologies*, p. 85.
[305] Rose, *Visual Methodologies*, p. 104.
[306] Rose, *Visual Methodologies*, p. 92.
[307] Rose, *Visual Methodologies*, p. 92.
[308] Rose, *Visual Methodologies*, p. 87.

Researcher reflexivity

Positionality is introduced here as key to taking a reflexive approach in this thesis. Positionality is very important for critical qualitative research,[309] and clearly identifying positionality allows for the identification of its impact;[310] reflexivity means being mindful of the context in which the research is being carried out.[311] Qualitative research is iterative,[312] so positionality was not just considered at the point of analysing the digital images and complementary primary material, but also in the planning and collection of the digital image dataset, and while conducting interviews with SMG staff. Danielle Jacobson and Nida Mustafa propose that thinking about positionality as a researcher includes being mindful of respect, power relations and responsibility:

> Our social positions influence how we approach, investigate, and analyze [sic] data; it determines the lens through which we see the world. We come apart at the research process. There is nothing wrong with seeing the world in a particular way, but it is important to be reflexive and explicit about how it may impact our work (Day, 2012).[313]

The researcher here is understood as a co-creator of knowledge, and the point through which the research project passes. Therefore, making positionality explicit is important to understanding its impact on conclusions reached.[314] It

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[309] Andrew Gary Darwin Holmes, 'Researcher Positionality - A Consideration of Its Influence and Place in Qualitative Research - A New Researcher Guide', *Shanlax International Journal of Education*, 8.4 (2020), pp. 1–10, doi:10.34293/education.v8i4.3232; Danielle Jacobson and Nida Mustafa, 'Social Identity Map: A Reflexivity Tool for Practicing Explicit Positionality in Critical Qualitative Research', *International Journal of Qualitative Methods*, 18 (2019), p. 1609406919870075, doi:10.1177/1609406919870075.
[310] Jacobson and Mustafa.
[311] Darwin Holmes, p. 2.
[312] Jacobson and Mustafa, pp. 6, 10.
[313] Jacobson and Mustafa, p. 8.
[314] Jacobson and Mustafa, pp. 10–11; Darwin Holmes, p. 5.

was important for me to be aware of my own position within and in relation to the research.

The position of the researcher as insider/(outsider) is widely discussed, and it is noted that a researcher's positionality is not a static or fixed thing.[315] Holmes, in the article *Researcher Positionality – A Consideration of Its Influence and Place in Qualitative Research - A New Researcher Guide,* introduces the insider/outsider debate, defines what these constructs mean and describes how they may be useful.[316] For example, there can be an outsider-to-insider transition over the course of the research.[317] The researcher as insider may 'be inherently and unknowingly biased, or overly sympathetic to the culture,'[318] or may not articulate information that is seemingly 'obvious' to them.[319] I acknowledge my insider status a researcher in this project. Being an insider does not mean that you have an advantage – both insider and outsider positions have advantages and disadvantages – rather the point is to be aware of one's positionality. How do I navigate my museum insider position when it is the visitors' or users' perspective and use of the collection that this thesis seeks to better understand? Am I too embedded in the museum, as a CDP student, or will this enhance the research?

There is a need for reflexivity in the analysis of the digital images in this thesis. What does it mean to be reflexive here? I have previously been employed as a heritage professional, who has worked with collection management systems that use object photography to document collection objects. This current research has been undertaken while I have been based within the Science Museum Group. As a design historian, I am interested in the materiality and historical context of the objects that are being photographed. As a Twitter user,

[315] Darwin Holmes, p. 2.
[316] Darwin Holmes, p. 6.
[317] Darwin Holmes, p. 8.
[318] Darwin Holmes, p. 6.
[319] Darwin Holmes, p. 6.

and a museum object image sharer on social channels, I use social media to engage with cultural heritage data in a particular way. Although this is not the focus of the research, these factors will have influenced how the analysis of the images was undertaken.

As the researcher undertaking this thesis, I acknowledge my reflexive position. I am a white British woman, in her 30s at the time of writing, who has a background of working within contemporary art and heritage organisations. I was embedded within the SMG during the PhD and this positioning has affected my research.[320] Being embedded meant that I had privileged access not just to data but to people and processes within the SMG. My PhD was a collaborative doctoral partnership (CDP) between the SMG and the School of Advanced Study, University of London, which meant that I was based within the Group throughout my research. Indeed, I attended staff meetings, sat within the digital team based in London and one of my interviewees was one of the supervisors for this thesis. I was doing my thesis at the SMG, based at the London Science Museum site, and sat in the digital team for about a year before undertaking interviews. This shifted to homeworking further on in the thesis timeline, as this was produced during the Covid-19 global pandemic (this is further explored below). I had already done my primary data collection through Twitter and Pinterest before I conducted interviews. I undertook, processed and analysed all the interviews.

Methods for interviews

This thesis seeks to understand the construction of the Group's collection objects in digital form, so that it can evaluate how they are being shared through social media. One method for doing this has been interviews with museum

[320] Svend Brinkmann, 'Unstructured and Semi-Structured Interviewing', in *The Oxford Handbook of Qualitative Research*, Oxford Handbooks, Second Edition, Second Edition (Oxford University Press, 2020), pp. 424–56 (p. 437).

professionals. The purpose of interviewing staff members from various sites and positions across the SMG was to better understand how the SMG was both constructing and framing digital images of the collection.[321] The aim was to hear from team members engaged with social media for the Group, to understand how the museums were being engaged with by users and visitors through these channels. Other focuses were interviewing staff members who are involved in the production of content – digital images of collection objects and accompanying metadata – as well as those involved in strategic decision-making in the digitisation of the collection.

Interviews were carried out during the COVID-19 global pandemic. Some of the interviews took place during UK lockdowns.[322] The situation of participants was considered in advance to ensure interviews were safe and not intrusive.[323] Care was taken to make sure that those who were interviewed were able to speak to the researcher, were available and comfortable with being interviewed, and were not furloughed. Furloughing, also known as the 'Coronavirus Job Retention Scheme', was adopted by the UK government as "non-essential" businesses were forced to close. It meant that employees could remain in employment and be paid without having to physically go to work during Lockdowns.[324] Interviews took place during normal work hours. It was not possible to interview everyone who was originally identified due to the furloughing process, which mandated that employees in furlough did not undertake any work. The interviews were

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[321] Joel D. Aberbach and Bert A. Rockman, 'Conducting and Coding Elite Interviews', *PS: Political Science and Politics*, 35.4 (2002), pp. 673–76 (p. 673).
[322] 'COVID-19 and Occupational Impacts', *GOV.UK*, para. 33 <https://www.gov.uk/government/publications/covid-19-and-occupational-impacts/covid-19-and-occupational-impacts> [accessed 10 November 2023]; 'Timeline of UK Coronavirus Lockdowns, March 2020 to March 2021' (Institute for Government analysis) <https://www.instituteforgovernment.org.uk/sites/default/files/timeline-lockdown-web.pdf> [accessed 10 November 2023].
[323] 'Covid-19 Remote Recording - Oral History Society', 2020, para. 3 <https://www.ohs.org.uk/covid-19-remote-recording/> [accessed 1 September 2022].
[324] Natasha Bernal, 'The UK's Coronavirus Furlough Scheme, Explained by Experts', *Wired UK*, 3 March 2021 <https://www.wired.co.uk/article/uk-furlough-scheme-job-protection> [accessed 10 November 2023].

moved from in-person to Microsoft Teams, both anticipating and following SMG and University of London advice. As the Group is spread across Britain, it was in some cases easier to have virtual meetings, and indeed as 'norms' within working practices in the museum shifted,[325] even when working in person was allowed subsequent interviews were also carried out virtually.

The COVID-19 pandemic created a specific context that people lived through, one that seemed simultaneously both global and very personal. One thing that came through in the interviews, when interviewing SMG staff about their work, was the shift in temporality. It has been noted that when discussing work people can be future focused,[326] thinking less about the past you are enquiring about, but the interviews undertaken during parts of the pandemic that were having a major effect on people's lives were focused very much on the present. For example, the social media and digital team at SMG, like many other museums, found themselves to be the only parts of the Group that remained publicly accessible.

The interviews followed a qualitative format. They were semi-structed with open-ended questions, tailored to the role of the person being interviewed, to get the most of their expertise. There were eight interviews in total, conducted one-to-one through Microsoft Teams.[327] All interviewees had participant information sheets and signed agreements in advance of interviews (templates for these can found in *Appendix 1 – Interview participant consent and information form*). Participants were given interview questions in advance if requested. Interviews varied in length from around half an hour to an hour and a half. All interviews were audio recorded and transcribed. However, if they were audio *and*

[325] Aberbach and Rockman Here they suggest doing interviews where you can.
[326] Linda Sandino and Matthew Partington, *Oral History in the Visual Arts* (Bloomsbury Academic, 2013), p. 5.
[327] There was a ninth interview and while it did feed into the background context for the PhD, it was not used in the final analysis, as it was not possible to quote it.

video recorded through Teams, they were recorded and transcribed using in-built Microsoft Teams features.[328] As this is not ethnographic research, the video from the one recording that was in a video format was not analysed. The transcription method for the audio only interviews was semi-automatic, with a first draft being produced through automated speech recognition (ASR) then cleaned and analysed by hand.

A semi-automated approach was taken to make the most of the advances in secure ASR technology while allowing a cultivation of closeness to the transcripts through cleaning. Transcription of interviews can be a time-consuming process, and although ASR can speed up the process,[329] the initial transcript it produces will be useful but by no means perfect.[330] Undertaking interviews, listening while the speech-to-text ASR ran, then hand-cleaning the automated drafts to create the final transcript was how most interviews were processed. This allowed for quicker transcription but kept a closeness as a researcher to the interviews. Transcription is highly labour-intensive and can be a potential disadvantage of conducting open-ended interviews, but this was at least partially mitigated by the mixed approach adopted here.[331] Producing semi-automated transcripts was a learning process. Technology evolved during the period of data collection for the thesis, and for this reason not all interviews were processed exactly in this way. Exceptions include one interview conducted exclusively using Teams, and another that was manually transcribed in full. Some researchers have advised against using ASR for academic interview transcription,[332] for reasons including security concerns with using cloud based

[328] Only one was done this way.
[329] Joseph Da Silva, 'Producing "Good Enough" Automated Transcripts Securely: Extending Bokhove and Downey (2018) to Address Security Concerns', *Methodological Innovations*, 14 (2021), p. 8, doi:10.1177/2059799120987766.
[330] Christian Bokhove and Christopher Downey, 'Automated Generation of "Good Enough" Transcripts as a First Step to Transcription of Audio-Recorded Data', *Methodological Innovations*, 11 (2018), p. 3, doi:10.1177/2059799118790743.
[331] Aberbach and Rockman, p. 674.
[332] Bokhove and Downey, p. 2'[...]revisits the recommendation from the UK data archive (2017) not to automate the transcription[...]' .

and free web tools.[333] However, the non-sensitive nature of the interviews as well as the use of encrypted speech to text in Microsoft Word,[334] and the closed system in Teams, means that this was not considered a hindrance here.

Completing the interviews relied on a mix of different software and hardware, which was considered before getting started but evolved during the interviewing process. To audio record the interviews either the Voice Memos app on an iPhone was used or the in-built Microsoft Teams features. This reflected the evolution of video calling technology and features during the time of primary data collection. A robust internet connection also became a key tool in successful virtual interviewing.[335] Interviews were then stored in the researcher's password-protected cloud and encrypted devices. Microsoft Word was used to transcribe the interviews, initially using the real time 'dictate' feature. The interviews processed in this way used the 'real time' in-built function, playing the recording on QuickTime Player on an encrypted personal computer. Automatic transcription was undertaken using the Microsoft Word dictate 'Real-time Speech-to-Text' feature. This requires an internet connection and uses their restful API, but no data is stored and 'All data in-transit are encrypted for protection.'[336] There is no data trace using this function.[337] The 'Teams only' interviews used the inbuilt recording and automatic transcription features. A lot of the literature that has been written about this, Speech to text/ASR and 'internet interviewing',[338] although relatively recent, now reads as out of date.[339] These

[333] Da Silva, p. 2.
[334] eric-urban, 'Data, Privacy, and Security for Speech-to-Text - Azure Cognitive Services' <https://docs.microsoft.com/en-us/legal/cognitive-services/speech-service/speech-to-text/data-privacy-security> [accessed 25 August 2022].
[335] 'Covid-19 Remote Recording - Oral History Society', para. 11.
[336] eric-urban.
[337] eric-urban.
[338] Brinkmann, pp. 442–43.
[339] Paul Hanna, 'Using Internet Technologies (Such as Skype) as a Research Medium: A Research Note', *Qualitative Research*, 12.2 (2012), pp. 239–42, doi:10.1177/1468794111426607; Valeria Lo Iacono, Paul Symonds, and David H. K. Brown, 'Skype as a Tool for Qualitative Research Interviews', *Sociological Research Online*, 21.2 (2016), p. 12.

technologies improved dramatically over the course of the thesis, perhaps as a consequence of the remote working the pandemic prompted.

As a digital humanities thesis, semi-structured interviews with open-ended questions tailored to the expertise of each participant were employed.[340] These were not as systematic as those employed in the social sciences.[341] SMG staff were approached for their perspective on the Group's working, and semi-structured interviews were used to give them space to reflect on their practice.[342] The research included interviews with staff from the social media, curatorial, engagement and digital teams in order to get a broad understanding of digitised museum collection objects and working practices.[343] Semi-structured interviews can have a conversational quality, and as a method it differs from the way museum professionals might ordinarily reflect on their practice through blogs etc.[344] Although open-ended questions can be seen as riskier,[345] as interview time is limited and probing questions can mean less time for other areas,[346] it was judged necessary for the method to have space to follow a potentially fruitful line of questioning.[347] Open-ended questioning also allows the participant to frame their own answers.[348] Analysis of the transcripts was also conducted in a

[340] Erica L. Tucker, 'Museum Studies', in *The Oxford Handbook of Qualitative Research*, Oxford Handbooks, Second Edition, Second Edition (Oxford University Press, 2020), pp. 517–37 (p. 534); Parry, 'The End of the Beginning'.
[341] Jeffrey M. Berry, 'Validity and Reliability Issues in Elite Interviewing', *PS: Political Science and Politics*, 35.4 (2002), pp. 679–82 (p. 681) Berry concluded a systemic approach to interviewing would enhance confidence in data, therefore advocated for a rigid social science approach to interviewing.
[342] Tucker, p. 525.
[343] There was a weighting towards people from Science Museum London being represented in aspects of the interviewing, with people holding Group-wide roles in the sample being based in London.
[344] Aberbach and Rockman, p. 674.
[345] Jeffrey M. Berry, p. 679.
[346] Jeffrey M. Berry, p. 681.
[347] Aberbach and Rockman, p. 673; Brinkmann, p. 437.
[348] Aberbach and Rockman, p. 674.

qualitative thematic way, which is not as specific and systematic as coding.[349] Patterns were looked for,[350] as well as illustrative quotes across the transcripts.[351] Quotes may have been edited for brevity or paraphrased, as this is not a linguistics study.

Interviewing was employed as a methodological inquiry tool into staff understanding of their work from within the SMG. It shed valuable light on the decision-making process that goes into content production and curatorial choices.[352] It has been noted that 'elites' – and what this thesis interprets as professionals – are keen to articulate their perspective, views and justify their work.[353] Interviewing provided a more conversational format and therefore sits outside the means through which museum professionals can reflect on their work publicly:

> Although it is possible to find practitioner-authored articles about their own work or blogs that aid the researcher in achieving the same ends, the synergy created in the interview process sometimes leads to the discovery of aspects of the creation process that are entirely unexpected and that might not otherwise be discussed.[354]

Making explicit and documenting assumed knowledge was an important part of choosing the interviewing process to gather primary data.[355] How does the SMG's overall mission shape its output behind the scenes? [356] Interviewing was chosen to validate and reflect on the other primary sources used in this study.

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[349] Johnny Saldaña, 'Qualitative Data Analysis Strategies', in *The Oxford Handbook of Qualitative Research*, ed. by Patricia Leavy (Oxford University Press, 2020), p. 0 (p. 899), doi:10.1093/oxfordhb/9780190847388.013.33.
[350] Tucker, p. 534.
[351] Parry, 'The End of the Beginning'; Tucker, p. 534.
[352] Tucker, p. 525.
[353] Aberbach and Rockman, p. 674; Jeffrey M. Berry, p. 680.
[354] Tucker, p. 525.
[355] Tucker, p. 525.
[356] Tucker, p. 525.

Chapter 3 – Physical encounters shared digitally: in person encounters with the SMG collection

This chapter focuses on the question of how physical encounters with SMG collections objects are shared digitally, and specifically on the sharing through social media of digital images which feature an in-person encounter. This is in contrast to the sharing through people's social media of digital images of collection objects produced by the SMG itself, which will be explored in Chapter 4. In this exploration of physical encounters with SMG collection objects, the collection object need not have been encountered at a museum site. As previously outlined in Chapter 1, while this is not a unique functionality, Twitter has been chosen as a platform of study in this chapter because of its affordance of being able to share images taken by the user potentially in situ.

The images in the dataset created for this study were shared on Twitter and subsequently identified as containing SMG collection objects. The questions that will be considered include: what else other than the collection object(s) does the image contain? What does it show? What type of image is it, beyond its being digital? The contents of the digital images are first approached quantitatively before qualitative enquiry explores specific digital images in more depth. Close reading of specific tweets, or tweet threads, is undertaken to understand how the digital image and by extension the SMG collection object(s) is recontextualized by being shared through Twitter. The analysis also seeks to show whether this kind of sharing provides new understandings of the object(s)?

In this thesis, in order to gain a new understanding of SMG collection objects, it was originally intended to consider only Tweets shared by users outside the SMG. Therefore, both the methods for data collection and the research questions focused on understanding how the SMG collection was shared not by SMG accounts but by others. As documented in this chapter, however, analysis of the data revealed that some of the included tweets have come either from SMG staff accounts or from retweets of shared posts from official SMG accounts. That engagement with the SMG collection can be facilitated by those who know it well, whose job it is to understand it and who can effectively communicate using images and stories through their personal accounts is an important finding of this research. This has emerged as a practice of curators in particular, and curators for the rail collections, who tweet regularly about their work and have engaged social media followings, are well represented below.

This chapter's analysis is inclusive of retweets that show digital images of collections being encountered physically. These digital images depict physical encounters with collection objects and are included to provide data on how digital images of physical encounters are represented. If unique media only is analysed and discussed this is noted in the graph description and analysis. Unique media means, here, that Twitter has given it a unique media identifier. Impressionistically some of the images with different identification numbers look the same, but parsed computationally these images are unique in the Twitter dataset. As stated previously the 'N/A locations' images are not analysed in this chapter as they have not been physically encountered by a visitor or user, rather they have been shared by an institution or exist only in digital spaces.

This chapter is structured in seven parts, to explore how physical encounters with collection objects are shared through Twitter. There is a brief literature review for the practice of sharing digital images, to frame the behaviour

of taking pictures of collection objects in person and sharing them on social media. This is augmented by fieldwork observations from time spent in the museum and gallery spaces of SMG. The next section uses secondary literature alongside primary data, this time in the form of interviews, to understand the affordances of Twitter as a platform for sharing digital images of physically encountered SMG collection items. It describes the functionalities of Twitter to show how, as a platform, it is an actor in sharing content. Here it is also explained how SMG staff conceptualise Twitter as a space for sharing, and how they navigate its affordances. Their understanding of it as a space to share the collections, and their experience of users/visitors sharing collections content with them on Twitter is important context for the data analysis. Quantitative findings of the data analysis are then presented, derived from a dataset covering the period from 18 June 2019 to 18 December 2019. This section discusses how the data was tagged and analysed. Data visualizations and analysis present findings on aspects of the digital images like the nature of the images shared, the location they are shared from, the staging of the image, whether there are people in shot and if the collection objects feature in the background or foreground of the image. The chapter then turns to qualitative analysis, looking at the "star" or "big ticket" objects frequently shared in the dataset. Images taken at events that feature SMG collection objects are the second site of qualitative in-depth analysis of images. Selfies featuring collection objects are also analysed, before finally, images that feature in the in-process work of museum staff as well as collection objects are analysed.

The practice of sharing images in literature

There are many facets to the practice of image sharing. It does not involve only one thing or action. Image sharing can be framed as a performance. Twitter users sharing their experiences through the platform can be performative. Murthy argues that Twitter is a social media platform that creates a space for "ordinary"

people to broadcast their personal news or updates,[357] suggesting the importance of 'self-representation' for users in forming Twitter. [358] He further proposes that users are producing themselves, and by extension the Twitter platform, through the act of tweeting:

> Though not reductively Cartesian (i.e. not "I think therefore I am"), the act of tweeting is born from individual contributions and is about self-production. Indeed, microblogging services depend on regular posting by users. Without this regularity, the utility of social media such as Twitter diminishes significantly.[359]

Is the Twitter user producing themself, or are they performing and sharing a public version of themself? There is clearly a performative nature to posting on social media,[360] but is the action of posting purely performance? Can social media platforms be about more than personal meaning-making through taking and posting photos on social media?[361] Arias, in her work on sharing the visitor experiences of the Museum of Islamic Art through Instagram, uses the idea of "performative memories",[362] building on the work of other academics who have looked at social media as performance, [363] as a way of describing the dual nature of capturing a moment of looking/experiencing in one's life and sharing it with others. She posits that performative memories in the museum are 'the result of everyday, embodied, and affective experiences that allows the visitor to simultaneously negotiate his or her personal identity, that of the institution, and of the memory communities to which they belong.'[364] Budge, a design historian,

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[357] Dhiraj Murthy, *Twitter*, 1st edition (Polity Press, 2013), p. 8.
[358] 'Self representation is an important aspect of Twitter.' Murthy, p. 27.
[359] Murthy, p. 27.
[360] Murthy, p. 27.
[361] Budge and Burness.
[362] Arias.
[363] 'In addition to the notion of performative identities, the idea of "performative memory" is particularly relevant in this context. The concept of "performative memory" is derived from the notion that the meaning-making process of cultural and heritage values lies with the day-to-day interactions of and between individuals with their surroundings (Giaccardi 2012; Silberman & Purser 2012) and from the understanding that individuals may adopt a series of performative roles (Burness 2016; Warfield 2015) – such as through social media and photography.' Arias.
[364] Arias.

has explored Instagram as a meaning-making process in *Objects in Focus: Museum Visitors and Instagram*. She alludes to the 'Memory keeping role' of Instagram posts.[365] Within this framing, the performative act of tweeting is also one of memory and potentially meaning-making.

Figure 10 – Art gallery visitor Instagramming - Suess 2018. Process flow diagram for art gallery visitor creating, sharing and discussing Instagram post. Adam Suess, 'Instagram and Art Gallery Visitors: Aesthetic experience, space, sharing and implications for educators', Australian Art Education, Vol. 39. No. 1. Image 2. Pg. 116. The image cited here has been redacted to prevent copyright infringement.

Performative memory and meaning making through tweeting is a process, and not a singular action. The affordances of the Twitter platform create an environment for "quick reflections".[366] The focus of this chapter is image sharing on Twitter, but there is much to learn from those studying museum collections shared through different social media platforms like Instagram. Suess, writing from an art education perspective about art galleries and museums, posits Instagram as an ongoing process and trigger for memory,[367] a way of formalizing contemplation of images. He discusses the potential of Instagram as a memory

[365] Budge, p. 68.
[366] Murthy, p. 9.
[367] Suess, p. 109.

tool, and in Figure 10 above,[368] articulates the stages in which an Instagram post comes into being. In a timeline of the museum visitor sharing journey, he identifies three stages: the pre-visitation stage, the during-visitation stage and post-visitation stage (Figure 10). These are all part of posting an image to Instagram from the museum. Contemplation and reflection, already being involved in social media posting, physically being in the space, using phones to photograph the work, and then discussing the post on social media all form part of the sharing process. When thinking about sharing digital images of physical encounters with SMG collection objects through Twitter, framing that this act is inclusive of contemplation and discussion, whilst also acknowledging that it references the encounter is important. The sharing process can have an even longer timeline; a post is a culmination of different stages and interactions.

Social media is as much a space for content consumption as it is for production. Therefore, the audience on social media needs to be considered. Who are posters posting and performing for? A key concept in the existing literature that highlights an understood audience for users posting their content is 'context collapse.'[369] This is the flattening of lots of different social contexts (work, family, friends) into social media spaces with a singular amalgamated audience. It has grown out of the shift from users online in the 1990s having anonymous avatars to needing their social media user accounts to reflect their actual identity.[370] The notion of context collapse has been discussed as

[368] Suess, p. 116.
[369] Jessica Vitak, 'The Impact of Context Collapse and Privacy on Social Network Site Disclosures', *Journal of Broadcasting & Electronic Media*, 56.4 (2012), pp. 451–70, doi:10.1080/08838151.2012.732140; Elisabetta Costa, 'Affordances-in-Practice: An Ethnographic Critique of Social Media Logic and Context Collapse', *New Media & Society*, 20.10 (2018), pp. 3641–56, doi:10.1177/1461444818756290; Alice E. Marwick and Danah Boyd, 'I Tweet Honestly, I Tweet Passionately: Twitter Users, Context Collapse, and the Imagined Audience', *New Media & Society*, 13.1 (2011), pp. 114–33, doi:10.1177/1461444810365313; Petter Bae Brandtzaeg and Marika Lüders, 'Time Collapse in Social Media: Extending the Context Collapse', *Social Media + Society*, 4.1 (2018), p. 2056305118763349, doi:10.1177/2056305118763349.
[370] Brandtzaeg and Lüders, para. 1.

spatial,[371] temporal,[372] and culturally specific.[373] It is concerned with people's social behaviours online in different networks and spaces and therefore has not been applicable to the recontextualisation of museum collections and objects here. To understand context collapse would require close examination of user accounts and behaviours, which is outside this thesis's scope.

Consumption of social media posts without contribution is a user activity. Reception is not the focus of this thesis, however it is important to position social media posts as digital objects that are read and viewed, as well as constructed and shared. How are we positioning looking? Is it passive or active? In her work, Budge describes the Instagram audience as an "eye".[374] There are certain types of audience who are passive but present, often described as a "lurker". Lurking is not a behaviour that produces content. In their book *Lurking*, McNiel positions this behaviour as having access to personal aspects of people's lives through posts and photographs that they have posted online. Being able to look through these anonymously, without malice, means that '[...] simply by that nature of having this internet, people are so immediate and present [...]'.[375] There is some passive audience reception of performing your everyday life through social media, but perhaps passive is not the best description of this behaviour, as looking is still an action. Indeed, under the subheading 'Lurking verses Peripheral Participation' Bradley Horowitz, working on Yahoo!, is in praise of the "lurkers" as not everyone needs to 'participate actively' for the business model to be successful.[376] Specifically for Twitter, Murthy describes the act of being able to lurk as shaping the experience of consuming content on Twitter through users' timelines: 'This shapes Twitter because anyone can "lurk" (i.e., observe profiles

[371] Marwick and Boyd.
[372] Brandtzaeg and Lüders.
[373] Costa.
[374] Budge, p. 69.
[375] Joanne McNeil, *Lurking: How a Person Became a User* (MCD, 2020), p. 4.
[376] Henry Jenkins, Sam Ford, and Joshua Green, *Spreadable Media: Creating Value and Meaning in a Networked Culture* (NYU Press, 2013), p. 156.

without their target knowing of this lurking).'[377] In this way multiple content posts can be consumed without contribution. By contrast Suess describes an active audience in his process of posting, one that actively participates by commenting on the posts of others. This could lead to collaborative meaning-making through discussion, or the discussion of experience.

Sharing images through social media constructs a story. From Suess's work we see that reflection is a key part of sharing an image from an art gallery visit, in formulating understanding through the process of posting. An important question for this thesis is whether we are witnessing the construction of narrative to tell the story of a museum visit, or to tell the story of an object? Weilenmann et al.'s research on *Instagram at the Museum: Communicating the Museum Experience through Social Photo Sharing* explored how narrative is being formulated through social photo sharing. There is a vivid description in one of the interviews of how a visitor moved through the museum and how this was captured in what she shared in her posts. Is this how narratives of museum visits are made with images? Weilenmann et al. build on secondary literature to suggest that camera phones lead to a different quality of storytelling practices compared with digital photography alone – the story is told *with images* [my emphasis on the plural].[378] This research is from 2013, eight years before the primary research for this thesis was undertaken. As outlined above, Twitter can be an immediate platform, and it is important to consider how this immediacy impacts the nature of the storytelling with images in this research's dataset. Suess suggests that there is always a period of reflection when sharing images through social media. Are they quick reflections in relation to the SMG collection

[377] Murthy, p. 4.

[378] 'With digital photography, in contrast, storytelling practices are somewhat different: "these devices seem to lend themselves to a different sort of photographic communication— one that involves telling stories with images" ([18] p. 348, original emphasis).' Alexandra Weilenmann, Thomas Hillman, and Beata Jungselius, 'Instagram at the Museum' (presented at the CHI '13: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, 2013), p. 1844 <https://dl.acm.org/doi/10.1145/2470654.2466243> [accessed 10 March 2020].

objects or are they concerned with an individual's visit? How closely are these two elements entangled?

Affordances of Twitter and impact on sharing behaviours

Twitter began as a microblogging platform, but it has evolved to support the sharing of digital images. Sharing images through Twitter recontextualises them. Consequently, it is important to understand which functions of the platform support this activity and what impact they have on this recontextualisation. The *platforms of interest* section in Chapter 1 includes a more detailed introduction of the Twitter platform, and what informed its selection as a case study, but a brief summary is provided here to introduce Twitter's affordances. Twitter is a fast-paced social media platform, with tweets posted by users acting as "quick reflections".[379] Users are able to post tweets themselves, originally restricted to a limited number of characters, or they can retweet other users' tweets, "broadcasting" them[380] and therefore amplifying their reach. Tweets can contain media and the platform supports multiple types of media-sharing, including gifs and videos, as well as digital images. Web links can be embedded within tweets, and the user interface allows for both free-text searching and searching by hashtags. It is possible to access trending hashtags through the search interface, adding to the real-time interaction with Twitter content.

> Though restricted to 140 characters, Twitter has simple yet powerful methods of connecting tweets to larger themes, specific people and groups. This is a unique aspect of the medium. Specifically, Tweets can be categorized by a "hash-tag." Any word(s) preceded by a hash sign "#" are used in Twitter to note a subject, event, or association. Hashtags are an integral part of Twitter's ability to link the

[379] Murthy, p. 9.
[380] Murthy, p. 7.

conversations of strangers together. [381]

At the time of this study, the Twitter interface had a timeline of rolling tweet content which was unique to each user depending on who they follow and whose tweets they have been liking and retweeting. This functionality changed after the period of data collection for this thesis, as the timeline interface for "X" was split into 'For you' and 'Following'. X/Twitter in early 2024 is a notably different platform from when the data collection for this thesis took place in 2019. The affordances of the platform that influenced the image sharing behaviour analysed here were present from 18 June 2019 – 18 December 2019.

The affordances of Twitter as a platform provide context for users' image sharing behaviour, but its functionality also shapes ways of working by SMG staff. Interviews with staff at the Science Museum Group, in particular those who oversee or are closely affiliated with the Group's social media channels, offer an insight into how Twitter's affordances influence interactions with users/visitors on the platform. Those who work with SMG social media channels know how these are being interacted with, and by whom. There is an awareness of meeting people on their Twitter feeds; it not an exclusively museum space.[382] There is also an awareness of the specificity of different audiences on different platforms,[383] which builds on awareness in some of the museums that they have dedicated and/or local audiences.[384] The staff understand the affordances of the platforms.[385] Although SMG's use of social media channels is not the focus here, staff knowledge of Twitter affordances, functionalities and SMG audiences on the

[381] Murthy, p. 3.
[382] Will Stanley, Interview with Will Stanley by Rhiannon Lewis, 2020; Kate Campbell-Payne, Interview with Kate Campbell-Payne by Rhiannon Lewis, 2020; Laura Humphreys, Interview with Laura Humphreys by Rhiannon Lewis, 2020.
[383] Stanley.
[384] Joe Randall, Interview with Joe Randall by Rhiannon Lewis, 2020; Tasha McNaught, Interview with Tasha McNaught by Rhiannon Lewis, 2020; Campbell-Payne.
[385] McNaught.

platform helped provide important context.

There are anecdotal interactions which illustrate how functionalities like hashtags and retweeting have been used. SMG staff were not likely to retweet visitors,[386] although they may have liked their content if tagged in it. Some SMG staff said that when they tweeted 'as the museum' they did not use Group hashtags,[387] but that is not true for all. Some staff generated and used hashtags, with the main concern being that they flowed in the tweet text organically,[388] so were made of whole words and contained no acronyms. However, there is wide adoption of and enthusiasm for use of popular hashtags that engage in a wider conversation such as #Onthisday/#OTD, #askacurator or #curatorbattle.[389] Use of these hashtags was planned in advance, with tweets designed to bring stories about STEM subjects and figures to a wider audience and share the collection. Understanding this practice helped shape data collection methods, as explored in Chapter 1, and here provides insight into sharing of content by users through SMG channels.

SMG staff see Twitter as a more informal space than other communication channels and a place for humour. Interview participants, if talking about sharing collections through social media, described the use of humour,[390] banter,[391] and an informal or irreverent tone.[392] The SMG is aiming for a 'friendly informative' tone.[393] Is the Group emulating user tone, or rather

[386] Campbell-Payne.
[387] Campbell-Payne.
[388] Stanley.
[389] Campbell-Payne; McNaught; Stanley.
[390] Randall; Campbell-Payne; Humphreys; Stanley.
[391] Randall.
[392] Campbell-Payne; Randall.
[393] Campbell-Payne.

participating in the tone of the platform? Are the people who tweet the collection emulating the tone of the Group? This chapter will explore the collected dataset user tweets to see. It is worth noting here again that all users included in the dataset are interacting in some way with the Group, through mentions or hashtags.

Multiple technologies make sharing possible

Social media platforms are one of several technologies that enable the sharing of collection images online. Documenting in-person encounters with collection objects requires infrastructure and hardware. Mobile phones are a key technology in enabling the instantaneous taking and sharing of images. Weilenmann et al. look to articulate and examine the narratives of visits to the Natural History Museum through visitor Instagram posts: 'Mobile technologies such as smartphones are a relatively common sight in modern museums and science centres. These technologies can be broadly categorized into those that are supplied to visitors and those that visitors bring with them.'[394] This suggests plenty of camera phones being used in 2013. Indeed, the Science Museum commissioned research in 2013 on their 'mobile audience', which found that of those who owned smart phones, 90% brought their device with them to the museum. However, camera phones are not the only digital photo technology. The same research (undertaken by research agency Frankly, Green + Webb in 2013) found that, of internet-enabled device ownership among those who visited the Science Museum, 'just over 80% of visitors owning a smartphone, 50% owning a tablet and a further 6% owning an alternative internet-enabled device.'[395] Onsite field notes suggested that images being taken in the museum were frequently being taken on digital cameras to document encounters and visits, and these

[394] Weilenmann, Hillman, and Jungselius, p. 1845.
[395] Frankly, Green + Webb, *'Mobile Audience Research' for Science Museum*, 2013.

could then have been uploaded to social media.[396] These technologies can also shape intentions and experience: a flat mobile battery can hinder picture taking,[397] and similarly so can heavy digital cameras.[398] Digital cameras with tripods are prohibited by visitor photography rules not applicable to other forms of photo taking.[399] The camera hardware used to take the image affects the processes that it has to pass through in order to be shared.

Hardware is only part of the pipeline of image sharing. To share content online there needs to be an internet connection. Although it's not necessarily true that visitors are instantaneously sharing their in-person encounters with SMG collection objects, infrastructure within the SMG can make this possible even without mobile data, meaning that people could be sharing from non-cellular devices. All five museum sites of the Group have free public Wi-Fi, although it should be noted that these are very different sites with multiple buildings, galleries, and inside and outside spaces. Field notes from SMG sites taken during a visitor survey that required use of Wi-Fi indicate that the Wi-Fi connection dropped on numerous occasions at several of the sites, [400] but that it could be consistent on some days in certain buildings. [401] This clearly has an unpredictable affect on the ability of visitors to upload their images. Joining the Wi-Fi also requires you to enter your personal details if you are over 16, which may be an additional source of friction for some users. The presence, or lack thereof, of Wi-

[396] Field notes whilst test surveying done at the Science Museum London, undertaken on the 24 October 2019, written up on the 25 October 2019.
[397] Field notes taken whilst test surveying at National Science and Media Museum, 1 November 2019.
[398] Field notes taken whilst test surveying at National Science and Media Museum, 1 November 2019.
[399] Randall.
[400] Field notes taken whilst test surveying at Science and Industry Museum 31 October 2019; Locomotion, Shildon, 29 October 2019; National Railway Museum, York 30 October 2019; and at National Science and Media Museum, 1 November 2019.
[401] Field notes whilst test surveying done at the Science Museum London, undertaken on the 24 October 2019, written up on the 25 October 2019 and Locomotion, Shildon, 29 October 2019.

Fi in galleries could affect image sharing behaviours.

Even before they get uploaded to Twitter, the act of taking photos is social. There are social behaviours that influence how and if people take photos in the museum. How people perceive what is and is not considered acceptable behaviour in the museum influences whether they will take images on their sites. While doing on-site surveys, which were eventually not included in this thesis, the researcher approached visitors in SMG galleries in November 2019. It was noted at Locomotion and Science Museum that people assumed that the researcher was a member of staff enforcing a no-photography rule, although photography is permitted across the SMG sites.[402] This would suggest that visitors to sites are taking and sharing images in-line with what they see to be social norms of the museum sites and spaces. Normalizing posting photos online means that people are more likely to do it. The literature review in chapter one introduces the idea that the easy taking of digital images facilitates the easy sharing of them. Digital ethnographic researchers have noted from their practice the movement that people have in their everyday lives between physical and digital, moving between both spaces through activities like sharing and discussing shared images through social media.

Image content analysis - what collection images are being shared?

Social media gives people the option to re-categorise the museum collections themselves,[403] separately from how the museum has conceptualized and applied its own collection categories. Museums have developed their own accessioning

[402] Field notes taken whilst test surveying at Locomotion, Shildon, 29 October 2019.
[403] Weilenmann, Hillman, and Jungselius, p. 1851.

and cataloguing processes for their collections over time, and collection objects are categorised and described in accordance with these. The processes are often shaped by why a particular collection was formed by the museum, and on an individual object level why that collection item was included within it. Re-tagging the shared SMG collection based on analysis of user-circulated content is another means of understanding the museum collections, outside the SMG's own reasoning and description of its collection. For the purpose of this thesis, it allows the collection to be understood outside an SMG context.

There is existing work on qualitative image tagging as a method to understand shared image content from museum and exhibition visits. Coding images to describe their content has been used before by academics to understand sharing museum collections and/or exhibitions visually through social media. This thesis builds on the work of Budge, and by extension Rose's visual methodologies from 2014: 'Visual content analysis is a methodology used to focus on the content of images, examining them for patterns, and coding and analysing such patterns to draw conclusions in relation to theory and related literature.'[404] The image coding methods originally devised by Lutz and Collins (1993), are presented here by Rose, these form the basis for later analysis in Chapter 5 on the Pinterest dataset.[405] Coding of images is used in a qualitative way for the Twitter dataset to be descriptive of the content in the Twitter image dataset. Image coding requires the codes to be devised and applied by the researcher, which could be problematic if claiming objectivity like Lutz and Collins.[406] All images that formed the Twitter dataset for this thesis were looked at individually and coded by the researcher. The framework devised by Arias was an inspiration for qualitative image coding that was descriptive of content. Arias used geolocation to define the dataset for her research on Instagram at the

[404] Budge, p. 72.
[405] Rose, *Visual Methodologies*, p. 97; Catherine A. Lutz and Jane L. Collins, *Reading National Geographic*, Illustrated edition (University of Chicago Press, 1993).
[406] Rose, *Visual Methodologies*, p. 378.

Museum of Islamic Art. Once her dataset was defined, a coding framework was devised.[407] The different types of image that were shared on Instagram were 'divided into categories, sub-categories, and sub-subcategories.'[408] This made it possible to observe trends in content of images that were shared through Instagram from the museum. Like Arias, this thesis categorizes the location of image taken, although more categories have been developed in order to understand the way in which collection objects were shared. Beyond understanding the sharing of images from one of the SMG museum sites, this thesis focused on the collection and therefore included non-museum sites from which object images were shared.

The Twitter dataset

The data represented and discussed in this chapter comes from Twitter. It was collected using the then open Twitter API,[409] using TCAT software over a six-month period between 18 June 2019 and 18 December 2019. SMG handle mentions and consistently used hashtags were used as collection terms, which created different bins. These bins were then cleaned to leave only tweets containing SMG collection objects, which are then analysed in both this chapter and Chapter 4. The methodology in Chapter 2 covers this process of collection and cleaning in more detail. When cleaning and coding the tweet images, the string of letters and numbers at the end of each media URL was used as a unique media identifier, within the tweet image file's URL string it featured as such: https://pbs.twimg.com/media/[unique media identifier].jpg. This ensured that each image cleaned and processed was unique as defined by Twitter. The cleaning process involved the researcher looking at and coding each individual image. It was possible to see that some were the same but the metric used to

[407] Arias.
[408] Arias.
[409] Barnes.

define unique images was the unique string of characters at the end of the media URL. This is different from the Tweet media ID number. Once the dataset of unique tweet images was cleaned and finalized, this was then merged with the downloaded CSV files of information from TCAT. Merging the files in this way created a master dataset, inclusive of all the metadata collected through TCAT software and all the hand categorizing work done by the researcher. It also meant that the dataset was re-populated with retweets, which would have been stripped out if only the unique media identifier was worked with.

The data collected from Twitter can be used, presented and described in a number of different ways. The corpus that contains only unique media identifier and was visually categorized contains 853 unique digital images, shared through Twitter, of SMG collection objects. When this is combined with direct downloads from the Twitter API via TCAT, to create a master corpus, the unique images are repopulated with retweets and metadata and this version of the corpus expands to 1,794 tweets. This chapter looks at digital images which feature an in-person encounter with the SMG collection object(s) and are then shared on social media. For this, the 1,794 tweets corpus could not be directly used without first making sure that only tweets that reflect this in-person encounter are included. Digital-to-digital sharing will be explored in Chapter 4, so tweets containing these images had to be separated out. This was done by taking the master corpus of 1,794 tweets and using OpenRefine to filter out Tweets that had N/A tagged as their location of object photographed. Categories of visual tagging are explained in detail below, but N/A as a subcategory of the location of an object means that there was not an obvious physical location for these objects. This would be the case, for example, for a close-up shot of the object where it is not possible tell the location (see Figure 11), or for a photo of a material photograph where the photo's

Figure 11- edited image of close up of flying Scotsman locomotion, focused on a sign that reads 'FRYING SCOTSMAN'. The image cited here has been redacted to prevent copyright infringement.

image content has a location, but you cannot see the location of that material photograph (see Figure 12). They were not encountered physically and for this reason they were not included in this physical-to-digital analysis of encounters with collection objects. The dataset referred to in this chapter – unless otherwise specified – is the master corpus with N/A location tweets removed and is made up of 1513 tweets.

Figure 12 – black and white photograph featuring four people wearing stilts outside with audience. The edges of the material photograph, as well as number 'A5901' in the top left are visible. Can be seen in reverse at Science Museum Group. The Sloan Family performing on stilts. 1983-5236/A05901 Science Museum Group Collection Online. Accessed 3 December 2024. https://collection.sciencemuseumgroup.org.uk/objects/co8223506/the-sloan-family-performing-on-stilts. The image cited here has been redacted to prevent copyright infringement.

This thesis used visual categories, building on the work of Budge and Arias, when analysing digital images shared through social media, following Rose's method of coding images to quantitively describe and analyse the physical-to-digital Twitter dataset. Visual categories are described and treated as fields when in data form. They are also further divided into subcategories; these are the different codes which are applied to each image to describe it within the high level visual categories. These are detailed in Appendix 3 – Table of categories for coding digital tweet images.

Physical encounters shared digitally emerged through the data within the 'digital amateur photo' subcategory found in the 'nature of image' content analysis category. Amateur photography is a helpful term for describing some digital images shared through social media and will be used in this thesis. It is a way of describing a particular type of photograph, both in aesthetics and action, which fits well with the ephemerality of Twitter, and indeed some image-sharing social media platforms. Katrina Sluis in *The Networked Image after Web 2.0* introduced amateur photography and its role within social media, starting with the idea of digital photographs initially suffering from loss and of people fetishizing analogue photography. Sluis praises amateur photos for their suitability in the training of machine learning models and uses Flickr as case study for looking at amateur photography. These photos, once shared through social media, bring with them rich metadata: 'The derided qualities of the amateur snapshot: its banality, ephemerality, insignificance, clichés, are precisely the values that we valorise and operationalised in the machine learning pipeline.'[410] The amateur snapshot, or what is termed here as amateur photography, is a key concept in this chapter because it is an act of

[410] 'The Networked Image after Web 2.0: Flickr and the "Real-World" Photography of the Dataset', p. 55.

documentation of a physical encounter with a collection object shared digitally. It is entirely different from the staged, well-lit and orchestrated collections photography explored in Chapter 5.

Data findings

There are a substantial number of amateur snapshots represented in the Twitter dataset. Figure 13 shows that the most likely digital image in the data would be one that: tags a railway museum; is located on SMG site, i.e., is a gallery/installation shot; is a digital amateur photo; shows the collection object in the foreground; does not include any people in the shot; and would stage the collection object in the gallery. Although not depicted here on the alluvial visualization, the collection object type will most likely be a train or trains.

The two railway museums of SMG (National Railway Museum and Locomotion) are well represented in the Twitter data. Of the consistently used SMG hashtags and mentions collected and analysed (otherwise referred to here as bins), there were three that dominated the dataset: 'railwaymuseum', 'sciencemuseum' and 'LocomotionSHD'. Of these 'railwaymuseum' had the largest proportion of tweets in the dataset. It is most likely that a tweet will not appear in multiple bins, although there are some tweets that do. This does not mean that there are not multiple other mentions embedded in the tweet text, since the visualization and data only represent the designated SMG handles and hashtags defined in the Twitter data collection process. The location that the images represent/where they were taken is most likely to be 'On the SMG site – gallery/installation shot', which is perhaps what we would expect for digital images that represent a physical encounter with collection objects. What the data also shows is that the second, third and fourth most likely locations for digital images are – in that order – 'Offsite outside', 'On SMG site – Outside',

‘Outside unknown’. These locations and totals will be explored in more detail later, but we can see that you do not need to be inside the sites of the SMG to be having an encounter with collection objects. It might be suggested that it is precisely because encounters are taking place outside the sites of the museum that Twitter users are keen to share these with the museum through the use of mentions and with images.

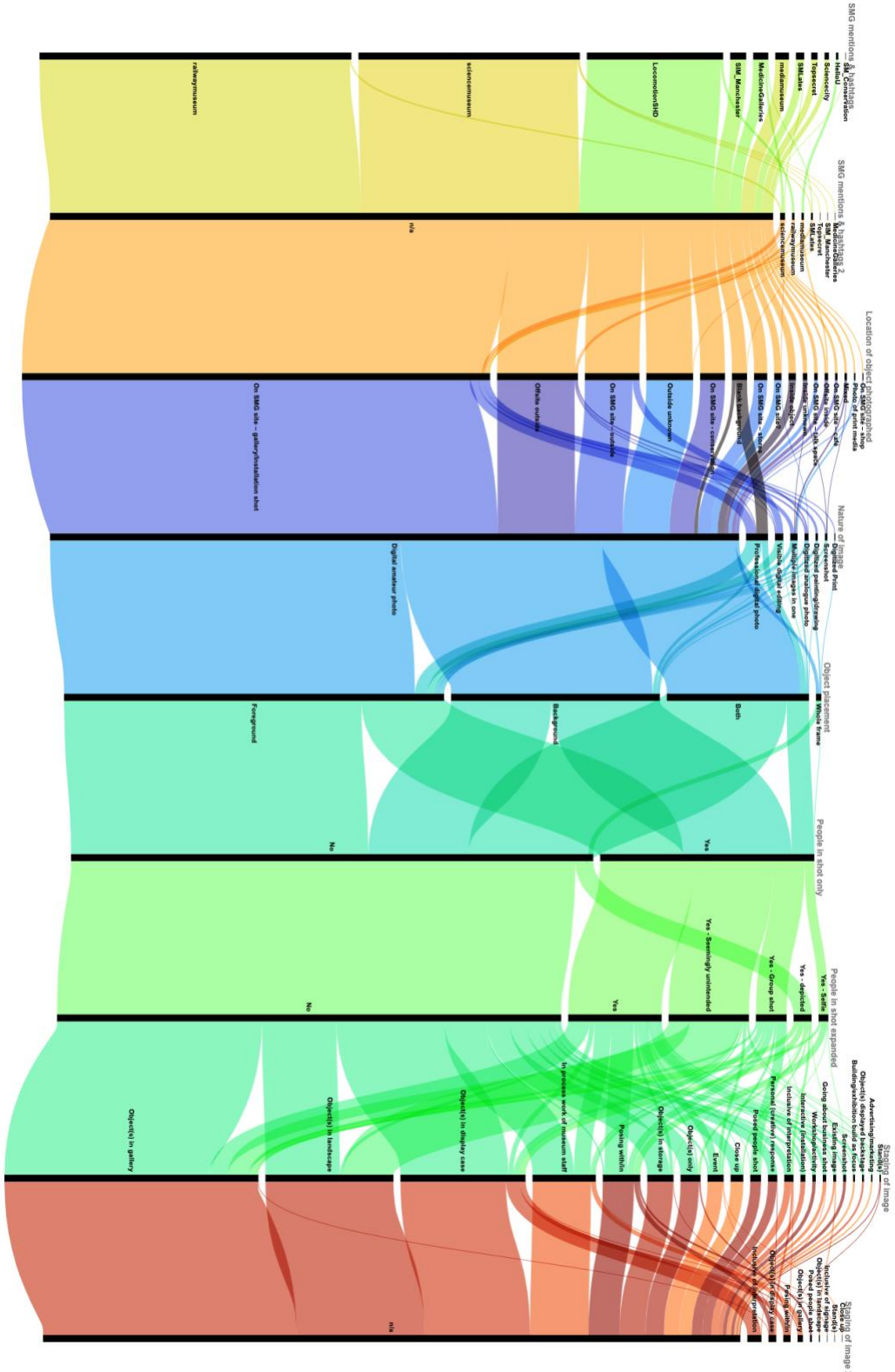

Figure 13 – Alluvial graph representing all tweets in Twitter image dataset. This graph represents only physical sharing, therefore 'location of object photographed' data field 'n/a' has not been included here. Retweets have been included.

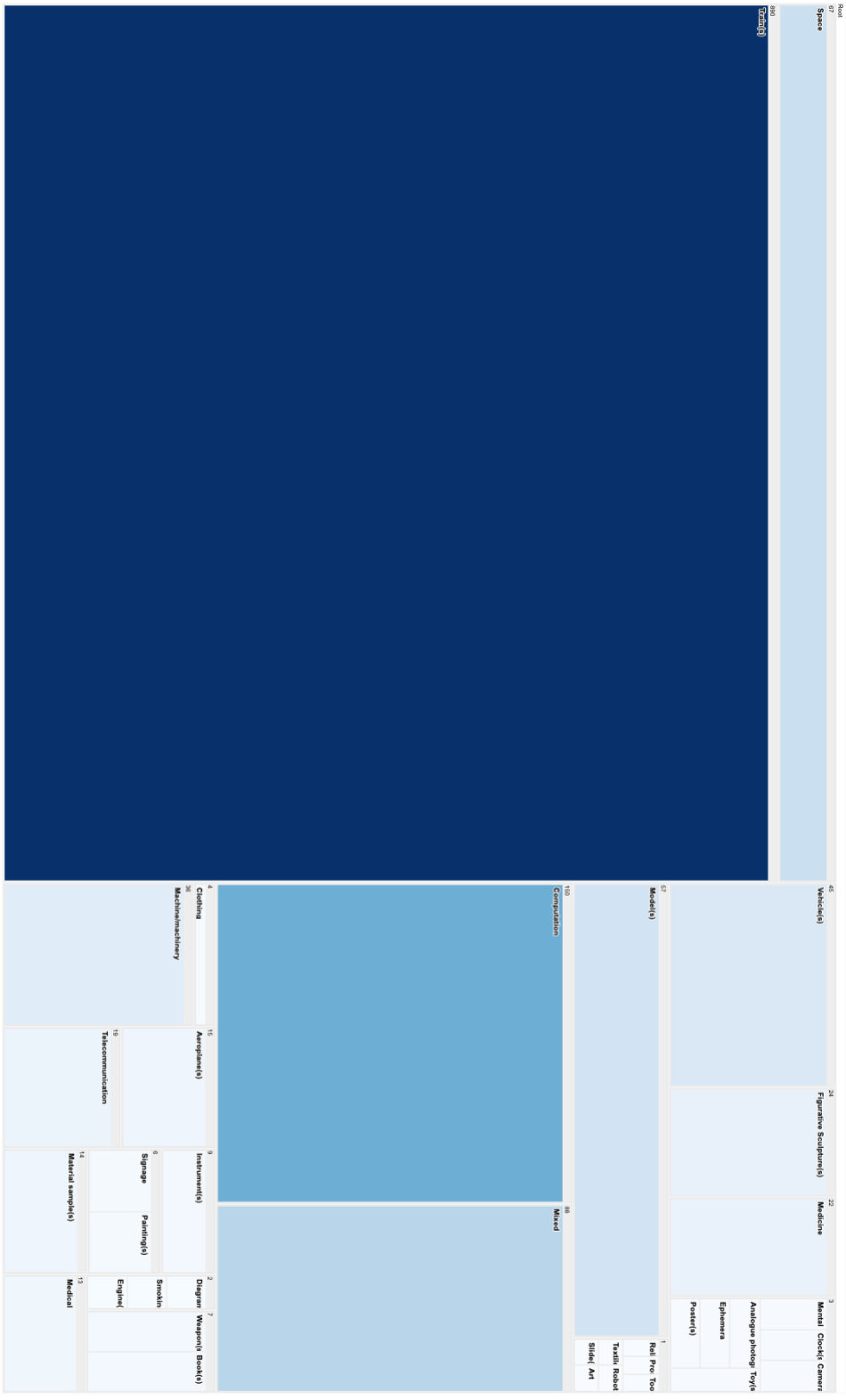

Figure 14 – Tree diagram of collection types represented in the Twitter dataset. This graph represents only physical sharing, therefore 'location of object photographed' data field 'n/a' has not been included here. Retweets have been included.

Overwhelmingly we see that the nature of the image represented in the dataset is ‘digital amateur photo’, which aligns with people having physical encounters with the collection objects and documenting and sharing the experience. The nature of these images are snapshots taken on phone or digital cameras, then shared to social media to document people’s experiences. They act as visual documentation – where someone takes the images themself – of the memory-making through photographing mentioned earlier in the chapter.

Collection object types

Trains are the largest type of collection object represented in the dataset. There are 890 tweets with a digital image that depicts a train, locomotive or train interior, which represents 58.82% of the dataset. Of the 11 possible bins, only two of them in the dataset directly reference trains (‘railwaymuseum’ and ‘LocomotionSHD’). The tree diagram of collection types in Figure 14 shows that ‘Computation’ is the next most represented collection type, although with 150 tweets, it is much smaller in comparison to ‘train(s)’. Interestingly, none of the ‘star objects’ depict a computation collection object, which would suggest that, while the collection type is highly photographable in terms of physical encounters with the collection objects, it is the collection type rather than any one object that people are keen to document and share. ‘Mixed’ is another large category, which suggests people taking photos of spaces that contain a number of collection objects so it is not possible to choose only one. For images like those of the gallery *Making the Modern World* at the Science Museum or display cases with a variety of objects, it is not clear what collection object the photographer is trying to capture. Rather, it seems to be the case that they wanted to get a sense of the collection object in the space.

'Space', as a collection type, has two star objects: Apollo 10 and 11.[411] The Exploring Space gallery is also one of the first that you walk into at the Science Museum on the ground floor, leading through to Making the Modern World where Apollo 10 is (also on the ground floor). The objects are often large and imposing, and physically dominate the gallery. During the period of data collection 'Hello Universe', an exhibition focusing on the sights and sounds of space,[412] was open at the National Science and Media Museum and had its own hashtag within the dataset. Although space as a collection type is one of the largest, it is surprising that collection objects of this type are only represented by 67 tweets in the dataset.

In contrast to the digital-to-digital sharing explored in Chapter 4, the collection object types 'Posters' and 'Medical' have some but comparatively little representation in the Twitter dataset. There are only three tweets depicting posters in the dataset, only 22 tweets depicting images containing medical collection objects, and a further 13 depicting medicine. Even combined, they only form 2.31% of the dataset. This seems to be a clear behavioural difference between the two forms of online sharing.

Train (train, locomotive or train interior) collection objects have the

[411] 'Model of Apollo Command Service Module (CSM) and Lunar Excursion Module (LEM) in Trans Lunar Configuration | Science Museum Group Collection' <https://collection.sciencemuseumgroup.org.uk/objects/co433631/model-of-apollo-command-service-module-csm-and-lunar-excursion-module-lem-in-trans-lunar-configuration-apollo-command-service-and-lunar-module> [accessed 17 March 2024]; 'Apollo 10 Command Module, Call Sign "Charlie Brown" | Science Museum Group Collection' <https://collection.sciencemuseumgroup.org.uk/objects/co40509/apollo-10-command-module-call-sign-charlie-brown-manned-spacecraft> [accessed 17 March 2024].

[412] SHAWANA FARSHIYA, '"Hello Universe": An Introduction', *National Science and Media Museum Blog*, 2019 <https://blog.scienceandmediamuseum.org.uk/hello-universe-an-introduction/> [accessed 17 March 2024].

biggest proportion of shared images in the data set, reflecting an engaged online community with a special interest in rail. As noted earlier, only two of the eleven bins represent rail hashtags and handles, however their collection object type represents 58.82% of the dataset. Rail content has a very large and engaged online audience, not only on social media platforms like Twitter but also on forums and crowdsourcing projects.[413] However, specific to social media and Twitter, there are railway subject specialists with large online followings represented in the data set, be they curators at the rail-based SMG museums or subject specialists. Their tweeting of SMG collections from their accounts has led to engagement with the digital images of collection objects, which leads to rail-type images being well represented in the data.

It could be argued that a large and engaged online community is not the only reason for rail collection objects to be so popular. Train, locomotive and rail collection items also tend to be big (this will be explored further below in the *Big ticket* objects section) and large collection objects encountered physically are more likely to be shared. However, their popularity could also be attributed to collection methods, i.e. collecting tweets using SMG hashtags and handles. These tweets were meant to be shared with and seen by the SMG. As locomotives and trains from the SMG collection have been encountered outside museum sites people have sought to share through SMG Twitter channels that they have encountered their objects. This has contributed to the high numbers of rail objects being shared as part of the data set.

[413] 'Railway Work, Life & Death', *Railway Work, Life & Death* <https://www.railwayaccidents.port.ac.uk/> [accessed 30 June 2022]; 'RailUK Forums', *RailUK Forums*, 2024 <https://www.railforums.co.uk/> [accessed 28 October 2024].

Figure 15 – Bar chart showing nature of images in Twitter dataset. This graph represents only physical sharing, therefore 'location of object photographed' data field 'n/a' has not been included here. Retweets have been included.

Nature of images

As noted above and shown in Figure 15, ‘digital amateur photos’ are overwhelmingly the most shared in the Twitter dataset. Interestingly, the long tail of data includes a number of categories that do not seem to fit with physical encounters with collection objects, for example ‘digitized analogue photo’, ‘digitised painting/drawing’. This may suggest limitations in the process of analysis.

In the category ‘digitized analogue photo’ we see people sharing their encounters with the materiality of some images. For example, the Twitter user in Figure 16 is sharing an image of the collection that they have found in transparent form. A serendipitous encounter, if not documented, might only have been experienced by them. In this way sharing an image through Twitter can be a recontextualisation of a collection object, but importantly also someone’s interaction with a collection object and their impression of it. The act of sharing captures an encounter, frames and describes it within a tweet, and then broadcasts it to the user’s followers. This again is ephemeral, but it is now featured on a user’s timeline, recontextualised within other such encounters.

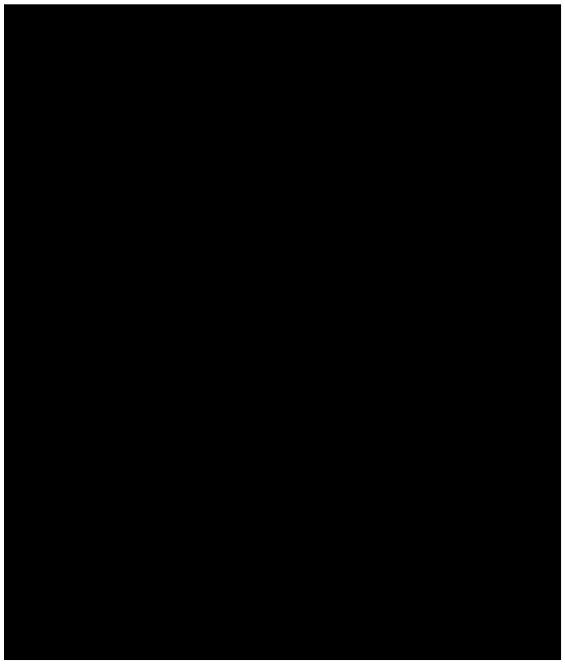

Figure 16 – Image of a slide being held against window light. The slide depicts a model wooden sailing ship on a blue and white background. The image cited here has been redacted to prevent copyright infringement.

It is not only amateur photography that is represented in the Twitter dataset. In 'professional digital photography' for the nature of image category, there are images that have been taken by a professional that document the gallery space (see Figure 17).[414] They have the quality of being person-less, as the photographer was there documenting what is seen, but the perceived audience is slightly different. The image is there to do a job, that is, to document objects and scenes, but the images have a different intention and therefore a different feel to the amateur snapshots taken by people on their personal devices visiting the museum. Although both have an unknown audience when shared through social media, these have marketing intent. There is also generally a difference in aesthetic quality, as the professional photos having good composition, colour balance and quality of light.

Figure 17 - Installation shot image of 'Self-Conscious Gene' sculpture by Marc Quinn (E2018.0887.1) in the SMG medicine galleries. Science Museum Group. 'Self-Conscious Gene' sculpture by Marc Quinn. E2018.0887.1 Science Museum Group Collection Online. Accessed 3 December 2024. https://collection.sciencemuseumgroup.org.uk/objects/co8638129/self-conscious-gene-sculpture-by-marc-quinn. © The Board of Trustees of the Science Museum, under a CC BY-NC-SA 4.0 Licence.

[414] Features on collection page. '"Self-Conscious Gene" Sculpture by Marc Quinn | Science Museum Group Collection' <https://collection.sciencemuseumgroup.org.uk/objects/co8638129/self-conscious-gene-sculpture-by-marc-quinn-sculpture> [accessed 17 March 2024].

‘Visible digital editing’ can be seen in Figure 18 where star object Mallard is shown off-site. This documents a physical encounter with Mallard, but the image has been edited with a red ring drawn around part of the locomotive that the sharer would like to highlight with their tweet. Although not strongly represented in the dataset, this could add to Suess’s pipeline of contemplation when sharing images of collection objects through social media that facilitates image sharing. It also demonstrates how images become part of the conversation. In this example, the image is used to describe and recontextualize the collection object in the tweet just as much as the tweet text.

Figure 18 – Image depicting Mallard at the platform in an outside train station, there is a man just in shot in the left foreground. The image has been edited, and a red circle surrounds the locomotives chimney. The image cited here has been redacted to prevent copyright infringement.

Location of digital images

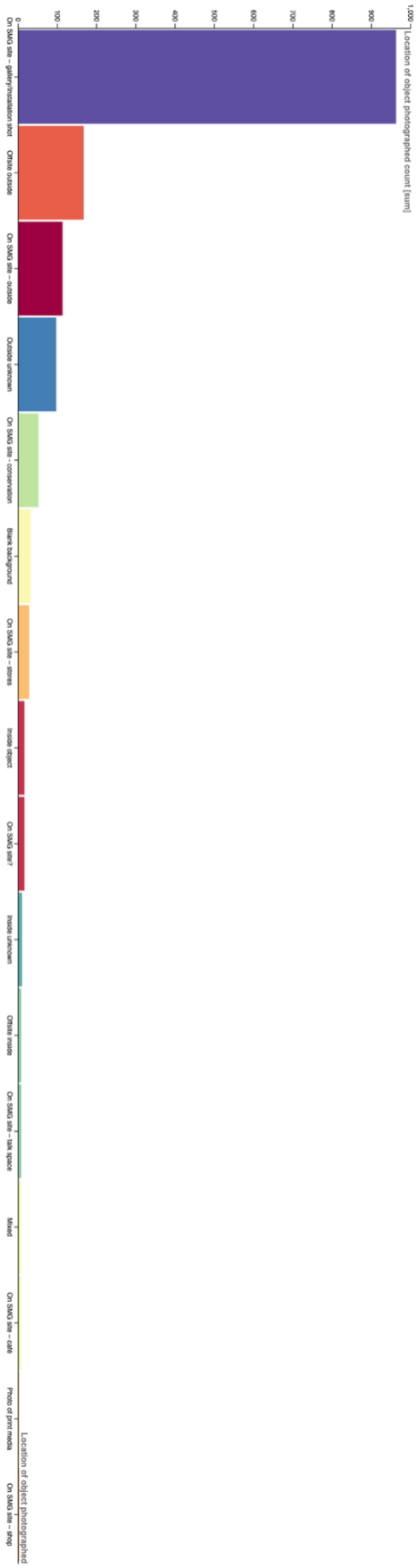

Figure 19 – Bar chart of location object photographed. This graph represents only physical sharing, therefore 'location of object photographed' data field 'n/a' has not been included here. Retweets have been included. Size was set to SUM.

Unsurprisingly, most shared digital images from the Twitter data depicted physical encounters with collection objects at SMG sites. From the bar chart in Figure 19 we see that most images represented in the dataset are on the SMG site in a gallery or installation. Then we have a long tail of possible other location sites for the digital images of the collection to be taken. The long tail includes some perhaps unexpected places to be encountering, documenting and sharing SMG collections. Perhaps by virtue of café placement in sites like NRM we have tweet image locations being shared from here. Equally the shop is also represented in the dataset.

As discussed earlier, the data would suggest that the SMG collection is also likely to be encountered outside of the buildings. Indeed, the second most popular location for the images to be taken is outside and offsite from the SMG, with 166 tweets represented in the dataset. This is due to the nature of the SMG collection, with objects like locomotives and trains able to travel around the country and therefore meet people outside of the sites of the museum. One important outcome of this research is the value of collecting tweets through SMG hashtags and mentions rather than using surveying methods tied to physical locations, which allows for collection encounters to be documented outside the SMG museum sites.

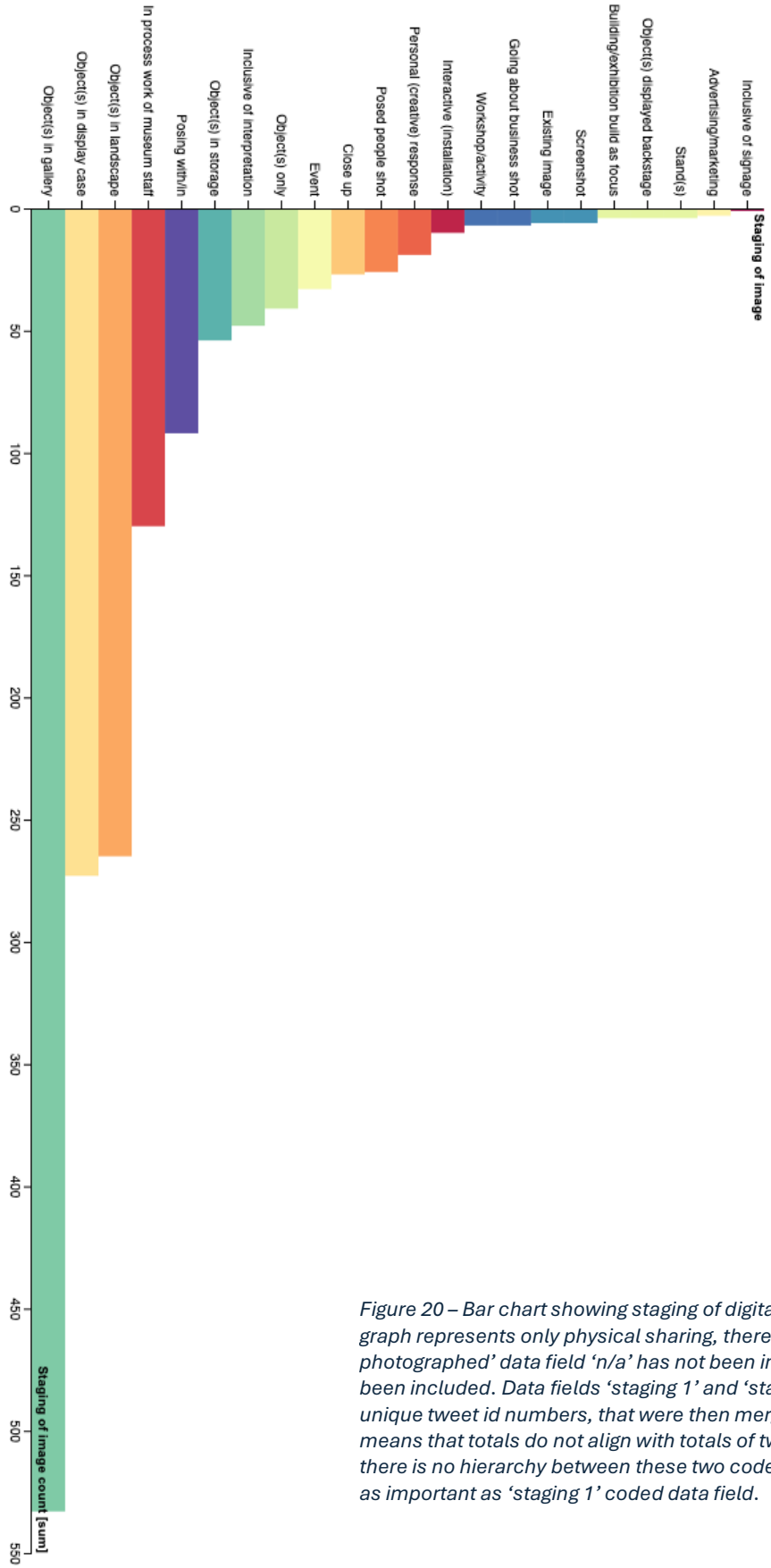

Figure 20 – Bar chart showing staging of digital images in Twitter dataset. This graph represents only physical sharing, therefore 'location of object photographed' data field 'n/a' has not been included here. Retweets have been included. Data fields 'staging 1' and 'staging 2' were downloaded with unique tweet id numbers, that were then merged into one column. This means that totals do not align with totals of tweets, but it also means that there is no hierarchy between these two codes, the 'staging 2' coded data is as important as 'staging 1' coded data field.

Staging of image

The 'staging of an image' category does not describe the visual location shown in the image, rather it seeks to set the scene for what was happening at the time the image was taken. It was possible to have more than one image staging tag. All tags were merged to create Figure 20.[415] Figure 20 showed that the most common staging for an image was likely to be the object in the gallery, followed by object in display case, then object in landscape. As this thesis focuses on the collection objects of SMG, it is not surprising that building/exhibition as focus is a small category in the dataset, even though this aspect of sharing has been featured more prominently in works that conceptualize the building as an object in its own right.[416] However, impressionistically through data cleaning, visitors are taking images of the building, especially at sites of Science and Industry Museum in Manchester.[417] The 'staging of an image' category is not only about the setting of the photograph taken. Staging of images is also a category where the work of SMG staff is being shared through non-official SMG channels. Images concerned with the 'In process work of museum staff' make up 130 tweets in the dataset, a phenomenon that will be examined in depth later in this chapter. These tweets shows that there are producers of and an audience for images of the behind-the-scenes, in-process work of SMG staff, not just their curated content. Twitter users were interested in how that content came to be and how the collections were being maintained.

[415] In the dataset there were two fields - staging 1 and 2 - to make sure all possible image staging was reflected. However, to generate the bar chart in Figure 20 these tags were merged. This means that totals will not align with totals of tweets, it also means that there is no hierarchy in the tagging process (i.e. staging 2 tags are as important as staging 1 tags).
[416] Arias.
[417] If an image is tagged building at Locomotion, these building images would be included in the dataset but tagged as On SMG site – outside in Location of image.

The close-up image staging further highlights the quality of encounters with collection objects. Although only represented by 27 tweets, as a subcategory 'close up' speaks not only to the nature of objects in the SMG collection, but also to the presence and agency of the photographer trying to highlight and share specific things about their encounter. The image shown in Figure 21 which received several retweets, shows a close up of the 1966 'Command Module Simulator main display console' used to train astronauts.[418] From the start of this thesis, a recurring worry expressed by SMG staff concerned the aesthetic quality of the collection, that it did not lend itself to being shared as images through social media. However, what we see here is someone highlighting a specific aspect of a much larger object. We partake in their act of looking.

Figure 21 – close up image of 'Command Module Simulator main display console' (L2019-526). The image cited here has been redacted to prevent copyright infringement.

Indeed, we see this view of the tape recorder in the 'Command Module Simulator main display console' as a recurring object view, as again below in Figure 22. This suggests that a collection object does not need to be aesthetically pleasing to be sharable, rather it needs to embody a compelling story that encourages the visitor to want to share that they were in its presence. However, the sharing of having physically encountered something impressive – in this case objects connected to the Apollo 12 mission, the second successful NASA mission that landed on the moon – goes beyond perceived beauty, which is, of course, always

[418] On loan from the National Air and Space Museum, Smithsonian Institution. L2019-526

subjective in any case.

Figure 22 – close up image – potentially with flash - of 'Command Module Simulator main display console' (L2019-526). The image cited here has been redacted to prevent copyright infringement.

The act of looking and image taking may still be to highlight what is canonically understood as beautiful in a collection object. In Figure 23 below, we see the Tweeter focusing on the reclining female figure that constitutes one of the four legs of a microscope displayed in the Science City 1550–1800 gallery. She is shown holding a retort, used for the distillation of substances.[419] The decorations seem to be a mix of gold and silver with floral and gemstone embellishments on this highly decorated piece of scientific equipment. The tweet is enquiring if another Twitter user will be joining an event at the museum the next day. This collection object relates to the same scientific field as the event mentioned, but through this close-up of this collection object we join the poster in the act of viewing. We all see this aspect of the object.

[419] 'Retort | Processing, Sterilization, Canning | Britannica' <https://www.britannica.com/technology/retort> [accessed 17 March 2024]; 'A Visual Guide to Chemistry Glassware', *Compound Interest*, 2015 <https://www.compoundchem.com/2015/03/17/glassware/> [accessed 17 March 2024].

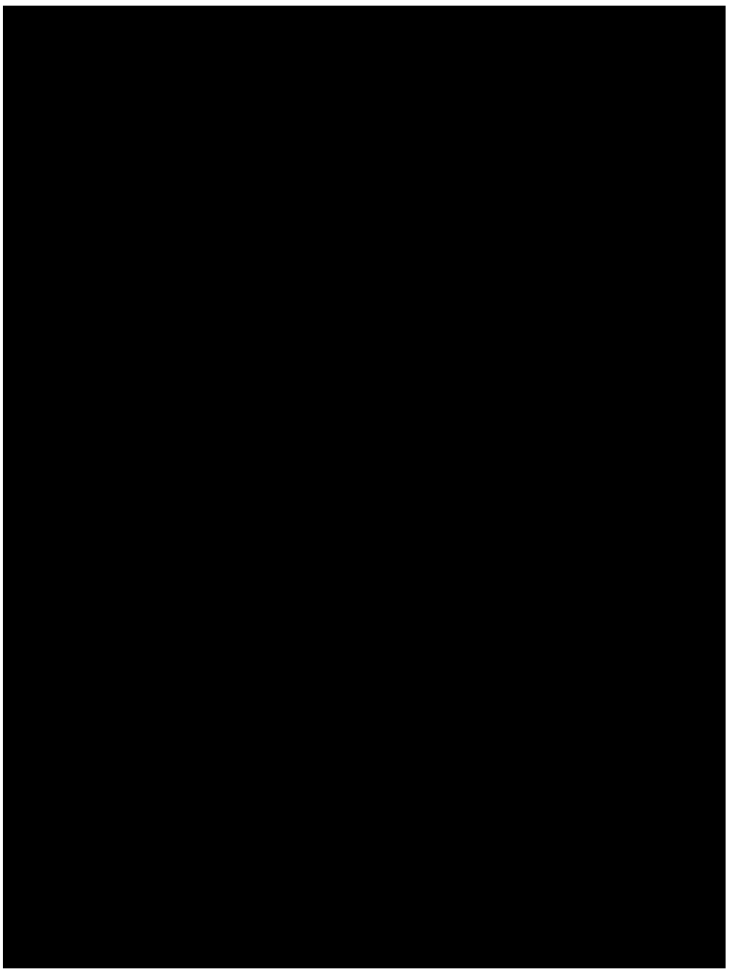

Figure 23 – close up image of sitting female figure in gold and silver, the bottom of a decorated microscope. The image cited here has been redacted to prevent copyright infringement.

There are a lot of models in the SMG collection. The close-up photo allows the image taker and sharer to be playful with scale. Although this is something that can be bemoaned by researchers who work with physical collections digitally,[420] the lack of context allows the taker of the image to be playful with scale recontextualized in the tweet and people's timelines. In Figure 24 the viewer, through the Twitter user interface, joins the original poster in looking into the interior of the model train carriage, perhaps with the drape of the fabric curtains being the only thing that gives away the true scale of the model. They "couldn't resist" sharing this view with Twitter and wider model train

[420] James Baker, 'Digital Is Material, Using Digitized Cultural Heritage in Research', in *Using Digitized Cultural Heritage in Research*, 2021.

community through the inclusion of a hashtag.

Figure 24 – Close up image looking through the window of model a train carriage. A miniature dinner service is visible, with curtains and upholstered seats, as well as the museum gallery through the opposite window. The image cited here has been redacted to prevent copyright infringement.

People in images

Whether or not people are featured in a shared image helps in interpreting what the Twitter user intended that image to show. In the Twitter dataset analysed here, it is more likely that there will not be people in the images of the SMG collection that are shared. Although people are shown in 440 of the tweets in the dataset, 1,073 tweets show no people at all. This would suggest that when sharing images of collection objects, it is more likely that those objects are the focus of the images, rather than people.

Background or foreground?

What was sought to be highlighted in the act of looking and capturing can again be explored through the positioning of the collection object within the image. Is it in the foreground of the image, presumably an intentional highlighting of that

object through the image? Alternatively, is the collection in the background, being shared but perhaps not with the same intention to highlight that object? We see that it is more likely that SMG collection objects photographed then shared on Twitter will be in the foreground. There are 781 tweets contain an object in the foreground, followed by 429 tweets where the object is in the background. 292 of the tweets include images that show a collection object in both the foreground and the background. This is perhaps by virtue of being the gallery – when photographing one object you may capture multiple other objects in the image. There are only 11 tweets depicting whole-frame images, a category that is more likely to appear in the digital-to-digital sharing of images or when sharing existing photos. However, when sharing from the physical encounter with the collection object these are likely to be the close-up images introduced above.

Big ticket objects

SMG staff are aware that certain objects in the collection are frequently photographed. Some objects cause people to stop and take a photo, and curatorial staff have tried to understand how to plan and curate these moments within the museum sites and galleries.[421] These frequently photographed objects have been referred to in interviews as 'big ticket objects' (in the context of this comment the speaker was specifically referencing professional collection photography). The phenomenon of 'selfie moments', referring to the practice of the photographer taking an image of themselves alongside a collection object, was also mentioned (see Figure 30 below). This practice was also described as 'photo opportunities' and 'hot spots' but these latter descriptors apply to the context of taking photography of the space more broadly.[422] These terms do not fit exactly with what is being described here, although they do allude to it and

[421] Tilly Blythe, Interview with Tilly Blythe by Rhiannon Lewis, 2020.
[422] Randall.

suggest an awareness of the practice. Despite its being used in the context of multiple professional collection photographs being taken of an object, this thesis has adopted the term "big-ticket objects" to discuss these frequently photographed and shared SMG collection objects.

Big ticket objects in the data were not always in alignment with what SMG staff imagined. In interviews, objects were mentioned that sometimes did correlate with what was shown in the data: *Apollo 10* and *Stephenson's Rocket* were both mentioned twice in interviews and are present as big-ticket objects in the data.[423] *Self-Conscious Gene* was mentioned in an interview as a potential selfie moment,[424] and is similarly strongly represented in the dataset. However, there were objects mentioned in interviews that did not have a strong representation in the dataset, for example *Soyuz*,[425] although this is probably because it was on temporary display. *The Difference Engine* was mentioned in interviews,[426] and positioned as an object likely to be photographed and then shared with SMG using the museum's handle, but it is not represented in the dataset. What was expected to be photographed repeatedly and shared by museum staff was sometimes correct but not always. This suggests that more data driven work on the collection sharing could be enlightening for SMG.

[423] 'Apollo 10 Command Module, Call Sign "Charlie Brown" | Science Museum Group Collection'; 'Rocket Locomotive | Science Museum Group Collection' <https://collection.sciencemuseumgroup.org.uk/objects/co26704/rocket-locomotive-steam-locomotive> [accessed 17 March 2024].
[424] '"Self-Conscious Gene" Sculpture by Marc Quinn | Science Museum Group Collection'.
[425] 'Soyuz TMA-19M Descent Module, S.P. Korolev Rocket and Space Public Corporation "Energia" | Science Museum Group Collection' <https://collection.sciencemuseumgroup.org.uk/objects/co8593265/soyuz-tma-19m-descent-module-s-p-korolev-rocket-and-space-public-corporation-energia-manned-spacecraft> [accessed 17 March 2024].
[426] 'Difference Engine No. 1 | Science Museum Group Collection' <https://collection.sciencemuseumgroup.org.uk/objects/co62243/difference-engine-no-1-difference-engine> [accessed 17 March 2024].

A number of objects in the dataset have been identified by the researcher as 'Big Ticket Objects'. They have emerged from the dataset, rather than being identified in advance by SMG staff, although it is possible for a collection object to meet both of these criteria, for example *Apollo 10*. It was not possible to automatically link objects to the corresponding entry in the SMG catalogue, as was done for the Pinterest dataset, and as a result not all of the photographed objects were securely identified and linked to their SMG collection object information. The approach to identifying the objects present in the images was manual. These are often well-known objects, so this was done with some ease by the researcher. They feature in the specific object name fields 1 and 2. In the unique digital image dataset, with retweets removed, if an object appeared in multiple images, it was noted. The table below represents the objects in the unique image physical sharing dataset and how many times they appear; multiple objects may have been tagged in one image.

Table 6 - Table of images total count of unique digital images in tweet dataset by big-ticket objects. Retweets have been removed. There may be more than one star object represented in image.

Big ticket objects	**Unique image representations**	**Unique image representations (N/A locations removed)**
Flying Scotsman	42	41
Mallard	40	36
Stephenson's Rocket	32	28
Inter-City 125	30	29
Apollo 11	18	18
Self-Conscious Gene	18	18
Bullet Train	16	16
Apollo 10	10	10
Deltic	10	7

These are all large objects, much larger than a human and with a striking physical presence in the sites of the museum, such as *Self-Conscious Gene, Deltic, Apollo 10* or *11*. Apart from *Self-Conscious Gene*, which is an artwork, they all are modes of transportation. Of the nine objects identified, six are trains or locomotives, and two are spacecraft (or a replica spacecraft). Some of the objects, being mobile, have been photographed and shared from outside the sites of the Museum, like *Mallard* and the *Flying Scotsman*. A collection object like *Stephenson's Rocket* was touring during the period of data collection, so we see it being photographed in multiple SMG locations as well as in transit (see Figure 45. It was not the only large and mobile train to be highly shared. *Mallard, Flying Scotsman* and *Inter-City 125* were all photographed offsite, and these images were shared through Twitter, with the SMG handles and hashtags included in the Tweets. *Mallard* is good example of the train being encountered and photographed in multiple locations (Figure 25– Figure 28). It occupied a position with a lot of footfall in the galleries, near the café in the great hall (Figure 27) and its positioning with a bridge overhead perhaps added to the composition of images taken. However, *Mallard* is also an example of an SMG collection object encountered and photographed outside of the museum sites (Figure 25 and Figure 28). In addition, close-ups of its paintwork are photographed and shared, with the images giving little or no location information about where *Mallard* was encountered (Figure 29). *Mallard* is a large, shiny and visibly striking collection object encountered across many sites.

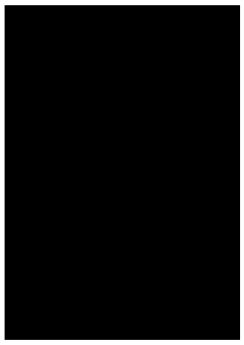

Figure 25- Mallard offsite from SMG. The image cited here has been redacted to prevent copyright infringement.

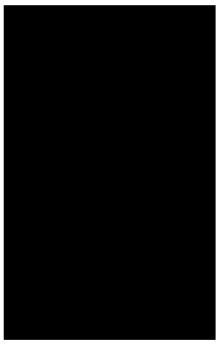

Figure 26 - Unusual location for Mallard at NRM. The image cited here has been redacted to prevent copyright infringement.

Figure 27 - Mallard in usual location at NRM. The image cited here has been redacted to prevent copyright infringement.

Figure 28 - Mallard offsite outside. The image cited here has been redacted to prevent copyright infringement.

Figure 29 – Cropped highlights of rail collections paintwork, including Mallard. The image cited here has been redacted to prevent copyright infringement.

Figure 30 – Woman taking a selfie with Mallard. The image cited here has been redacted to prevent copyright infringement.

Consciousness of what might make for a visibly striking image already existed within the SMG. There was an awareness among staff of areas of the museum where visitors might be taking photographs, what might cause them to do so, and what they might be hoping to show. At one of the SMG sites devoted to railways a staff member reflected:

> So in terms of objects it tends to be the big bright things that people would associate with being a train, in terms of photo opportunities it tends to be "here I am with so and so, here I am in the play areas" and things like that.[427]

Deltic and *Mallard* both have very vibrant paint jobs, and for visitors to the museum they are a physically imposing presence in gallery entrance spaces.

[427] Randall.

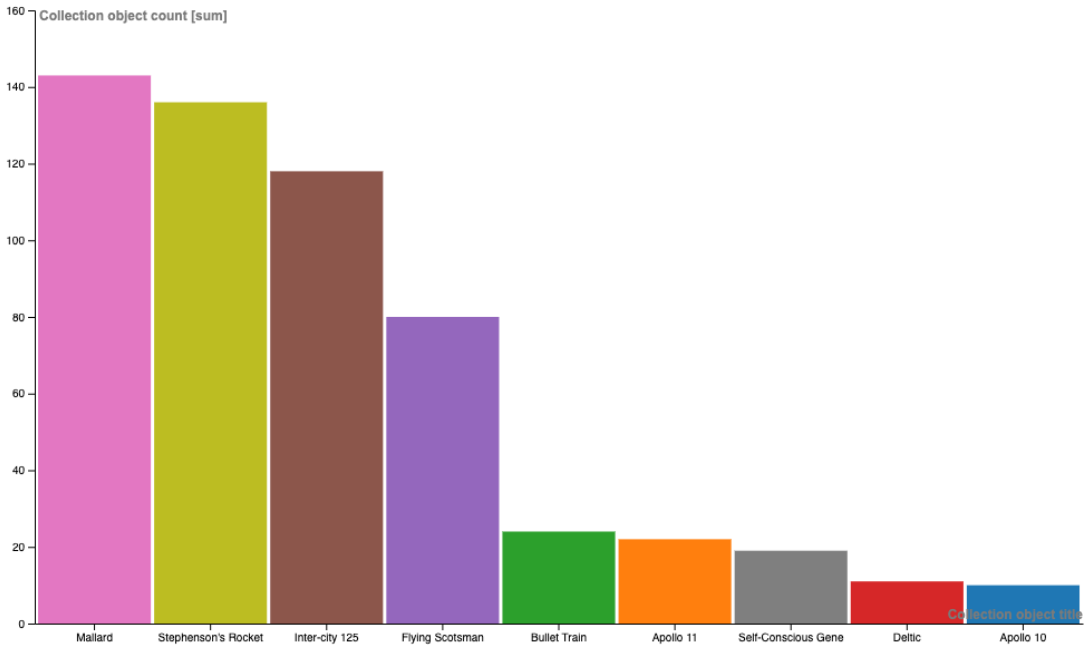

Figure 31 - Bar graph showing "big ticket" objects shared as tweets by number of tweets in Twitter dataset (with 'n/a' location removed). Retweets have been included.

The three most shared collection objects are all trains: *Mallard, Stephenson's Rocket,* and *Inter-City 125* (see table in Table 6). They differ slightly from the top three uniquely photographed objects - *Flying Scotsman, Mallard, Stephenson's*

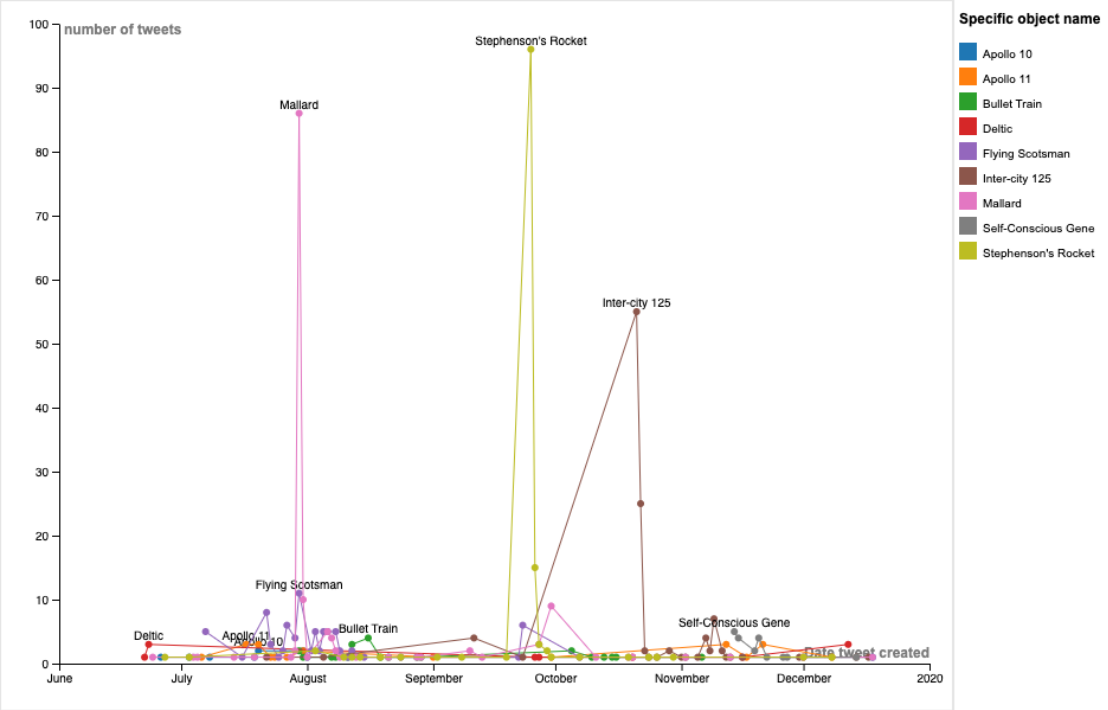

Figure 32- Line graph showing dates of big-ticket object shared tweets (with 'n/a' location removed). Retweets have been included.

Rocket - although again these are all trains, as shown in Figure 31 above. Figure 24 shows the date on which the objects were shared, to help understand if there is any chronological pattern as to when images of these objects were being posted on Twitter. Twitter is an immediate sharing social media platform; this affordance is reflected when images of big-ticket objects have been shared. There is an uneven distribution of tweets relating to big ticket objects. There are spikes of high tweet sharing for *Mallard* in late July and for *Stephenson's Rocket* in late September, while *Inter-City 125* was tweeted about in mid-September with a large jump to over 50 tweets in mid-October (see Figure 32). Although for *Inter-City 125* this is in part due to retweeting of a couple of posts about *Inter-City* from those with a large Twitter following,[428] this is not the sole source of *Inter-City 125* tweets. The activity related to *Stephenson's Rocket* is largely the result of retweets on 25 September 2019 of a tweet from the National Railway Museum account that simply says "OH HEYYYYYYY" and shows *Rocket* installed at the museum (see Figure 33 - Stephenson's Rocket installed at the NRM), heralding its return to the site for the first time in 20 years.[429] *Self-Conscious Gene* begins to be tweeted about from mid-November onwards, which is in-line with the opening of the Medicine Galleries on 16 November 2019.[430] There was notable tweeting about *Flying Scotsman* in early-mid July, which stayed fairly active until early August and then reached a peak in late August, only appearing again in late September. *Flying Scotsman* is high in unique images, but this has not translated into a sharing spike, as with *Mallard*, *Inter-City 125* and *Stephenson's Rocket*. The pattern suggests that there is consistent interest in the object, rather than

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[428] Tim Dunn, British Railway Historian and TV presenter and Antony Coulis, Senior Curator, National Railway Museum.

[429] 'Stephenson's Rocket Visits National Railway Museum for 10-Year Stay | National Railway Museum', 2019 <https://www.railwaymuseum.org.uk/about-us/press-office/stephensons-rocket-visits-national-railway-museum-10-year-stay> [accessed 31 March 2024]; Grace Newton, 'Stephenson's Rocket Is Now on Display at the National Railway Museum in York', *Yorkshire Post*, 26 September 2019 <https://www.yorkshirepost.co.uk/heritage-and-retro/heritage/stephensons-rocket-is-now-on-display-at-the-national-railway-museum-in-york-1749445> [accessed 31 March 2024].

[430] 'World's Largest Medicine Galleries Open at the Science Museum | Science Museum', 2019 <https://www.sciencemuseum.org.uk/about-us/press-office/worlds-largest-medicine-galleries-open-science-museum-0> [accessed 31 March 2024].

perhaps more events-linked activity indicated by the retweets. When an account with a large following tweets about an exciting event – as we have seen here with the arrival of *Rocket* at the National Railway Museum, or when railway experts with a large Twitter following tweeted from a National Railway event where *Inter-City 125* was on display - this can drive significant retweeting activity. It important to note that these very popular tweets emerged from professional Twitter accounts, but their success was due to their being retweeted by smaller personal accounts, and this is why they have shown up in the dataset. Image sharing on Twitter largely coincides with events, which have then been reflected by large tweet numbers in the dataset.

Figure 33 - Stephenson's Rocket installed at the NRM, visible through a brick arch. The image cited here has been redacted to prevent copyright infringement.

Big ticket objects drive a large amount of image sharing Twitter activity. Although there were some big-ticket objects that were identified by staff, i.e.

consciously curated moments like *Self-Conscious Gene*, there were others, like *Inter-City 125*, whose popularity only became apparent through analysis of the dataset. Big-ticket objects are most likely to be locomotives (trains) and they are also likely to be large physically imposing objects. They do not need to have been encountered in the spaces and sites of SMG, but can be encountered offsite, like *Mallard* in Figure 24, and then shared with SMG through Twitter. In general, the sharing of big-ticket objects is not linked with a specific exhibition, although if there is a spike in popularity on a particular date, this might be linked to a specific event.

Capturing events

One of the affordances of Twitter is its immediacy; there is an ephemerality to encountering posts through a user's feed. It is therefore a good site to explore events taking place, how these are shared through social media, and how these intersect with the collections being shared. Drawing on interviews with SMG staff and analysis of the Twitter dataset, this section will consider how the collection features in events at the SMG that are captured and shared on Twitter.

'Lates' is a monthly late-night opening event at the Science Museum. Although there are museum lates events at other museums in the UK, and there are late events at other SMG sites,[431] the SMlates hashtag is reserved for the late event specifically at Science Museum. The museum stays open later than its usual opening hours and organises specially programmed events and activities that are themed around the topic of the event: 'Science Museum Lates are adults-only, after-hours theme nights that take place in the museum on the last

[431] For example, there was a superhuman lates at the Science and Media Museum in Bradford Thursday 21 November 2019, 18:30-21:30.

Wednesday of every month.'[432] There were five Science Museum Lates during the period of data collection, although they were only captured effectively from July 2019 onwards because the TCAT bin to specifically collect them was implemented after the first event. The hashtag is publicized as part of the event so that people can share on social media using it and participate in conversations.

> [...] So, for specific ones for the museum they tend to be related to an event. So, for example, for the monthly lates, we have #SMLATES as a hashtag, and that's a way of people at the event finding a place that they can share comments. So, we advertise it on the lates map, we share it on Twitter and Instagram, and we're engaging with the audience that are using that on the night, as well as highlighting it for other people who are seeing our content.[433]

From SMG's internal reporting for 1 November 2019, the top performing Twitter post that week was a promotion for SMLates, which showed a picture of the map and the building at night. It received 47,640 impressions and 1.8% engagement or link clicks.[434] The Science Museum Twitter account was building engagement and awareness before the event, but this does not necessarily mean that people would have participated in conversations on the day.

People share their thoughts in real time during Lates. The Twitter dataset was cleaned to only include tweets that have an image of the SMG collection before further analysis, so tweets with more general reflections on SMlates, if they existed, were excluded. There were 21 tweets that represent SMlates mentions (from 14 unique Twitter accounts), of which 16 are original and five are retweets. There are five different lates events represented: the first took place on 26 June 2019 but only one tweet was captured, they were fully documented from 31 July 2019, although tweets from this also ran on to 1 August 2019 with retweets

[432] 'Lates | Science Museum' <https://www.sciencemuseum.org.uk/see-and-do/lates> [accessed 19 February 2022].
[433] Stanley.
[434] Internal reporting on Science Museum accounts social media stats.

and reflections; the next was held on 28 August; then 25 September 2019, and the final the lates event took place on 27 November 2019. Apart from 1 August 2019, time stamps would suggest that people are tweeting during, or just after the SMLates event. Some humorously reflected on their time spent (see Figure 35) or shared group experiences during the visit (see Figure 34). The event and the immediacy of Twitter have allowed people to share their thoughts on the collection as part of an event-based conversation.

Figure 34 – Glass cases in medicine galleries. Tweet text: "#SMLates, taking my friends to see the spoons #spoonspot #MedicineGalleries'. The image cited here has been redacted to prevent copyright infringement.

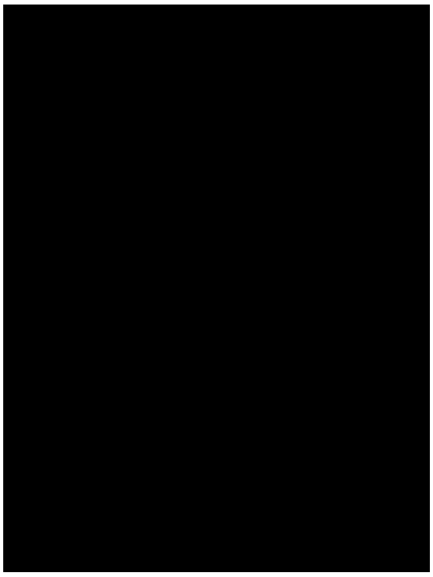

Figure 35 – Shot from below 'Self-Conscious Gene' tweet text: "No YOU spent two hours in the new Medicines gallery @sciencemuseum and still didn't see it all #smlates". The image cited here has been redacted to prevent copyright infringement.

The collection may be directly or indirectly referenced in the tweet text. From the examples in Figure 34 and Figure 35 we see that people may be directly referring to the collection. In Figure 34 they are discussing and showing us the spoons in the collection, displayed here in the gallery. Indeed, the user handle would suggest that this account is dedicated to displays of spoons. Figure 35 refers more broadly to the medicine galleries but shows the Marc Quinn sculpture specifically. It is the "star object" discussed later, an iconic image of the galleries that is used as an image to physically check into the space. Both tweet texts recontextualize the digital images of the collection through humour. Humour as

an aimed for communication style is a theme noted in staff interviews.[435] Tweets not only share images of the collection, but recontextualise them through humour.

How does the collection feature in images? Almost all of the images were digital amateur photos, suggesting people taking and sharing images of the event themselves. Only one is an image categorized as multiple images in one. SMlates data shows that all of the images taken were shared from onsite at the gallery or installation, and that the collection object tended to feature in the background, with 13 of the images showing the object in the background, three showing both and only five with the object in the foreground. This would suggest that with these SMlates image sharing the collection object was not the key focus – they happened to be in shot. For example, Figure 36 was shared by a museum and lates visitor tweeting their experience of the silent disco. The collection is part of the experience of the silent disco, since the spacecraft is an imposing physical presence in the room and overhangs where the silent disco takes place. In this setting, it could be suggested, the collection objects add to the experience of the event. This person is sharing their experience of the event. Their reflections on the collection are not object specific, but the objects add to the overall experience.

[435] Randall; Campbell-Payne; Stanley.

Figure 36 – Silent disco taking place in Science Museum: Exploring Space Gallery. The image cited here has been redacted to prevent copyright infringement. The image cited here has been redacted to prevent copyright infringement.

When documenting in real time, it becomes possible to understand the highlights of someone's journey through the museum and the event, in this case SMLates. Depending on how someone engages with Twitter it is possible to understand the highlights of their visit, for example Figure 38 – Figure 40 below are images from one user's Lates event, one of only two multiple tweeters in the SMLates dataset. The tweet text seems to suggest quick and/or humorous observations about the collection. The image quality is not great, and there is an amateur snapshot aesthetic, with the images always in portrait mode. This suggests that they were taken on the visitor's mobile phone before being shared. An example of the performative memory making process described earlier in the chapter. The images recontextualise the SMG collection within this person's evening, recording what caught their eye, and what they thought might be funny to share.

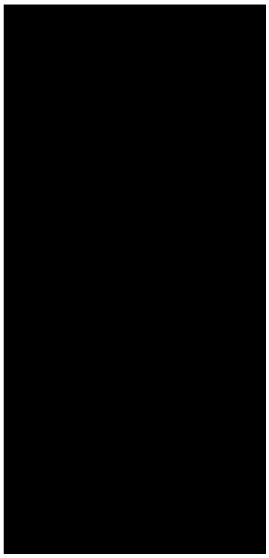

Figure 37 - tweet text: "Boaty McBoatface 😆 #smlates". The image cited here has been redacted to prevent copyright infringement.

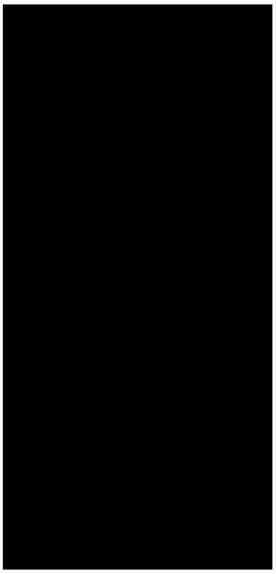

Figure 38 - tweet text: "Imagine having to use a foot operated vacuum cleaner in this day and age #smlates". The image cited here has been redacted to prevent copyright infringement.

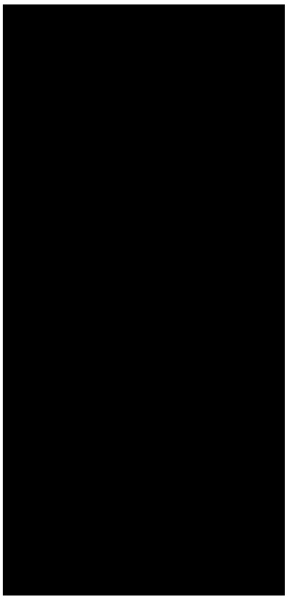

Figure 39- tweet text: "Seriously… how can anyone walks comfortably in those #smlates". The image cited here has been redacted to prevent copyright infringement.

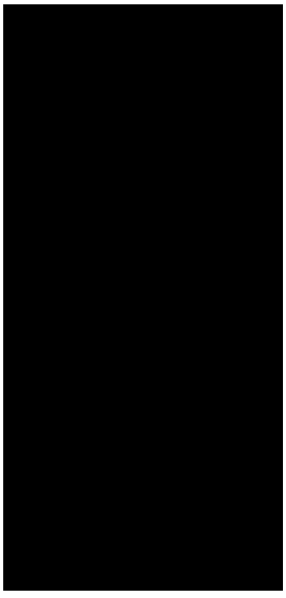

Figure 40 – tweet text: "Potentially @ladygaga's next outfit #smlates". The image cited here has been redacted to prevent copyright infringement.

In-process work of museum staff

In-process work of the museum staff is significantly represented in the Twitter dataset. These tweets are not being shared from official SMG accounts. In the dataset there were 130 individual tweets within the 'staging of image' subcategory of 'in process work of museum staff', of which 38 had unique images. The unique images in the dataset are explored in Figure 41 below, to understand what work by museum staff and what objects in the collection were shared. It was possible to look at this smaller dataset of 'in process work of museum staff' using manual analysis and coding. From the alluvial graph in Figure 41 we can see that documenting the work of museum staff is happening across the sites, although it is most likely to be mentioned at the National Railway Museum. It is happening both outside and inside, onsite and offsite, although the three most likely locations are all on SMG sites: 'On SMG site – gallery/Installation shot', then 'On SMG site – outside', followed by 'On SMG site – conservation'. The variety of locations is interesting because it gives a context to the work of the museum staff that is not always seen. Twitter is here being used as a channel to share the work of staff that is not always possible to document in other locations such as the galleries, or even on the museum's other social media channels like blogs. Largely they are digital amateur photos, suggesting that they are candid in nature. It is more likely that only one collection object is shown in the images in this category, with the most likely type of collection object to be shown once again being trains.

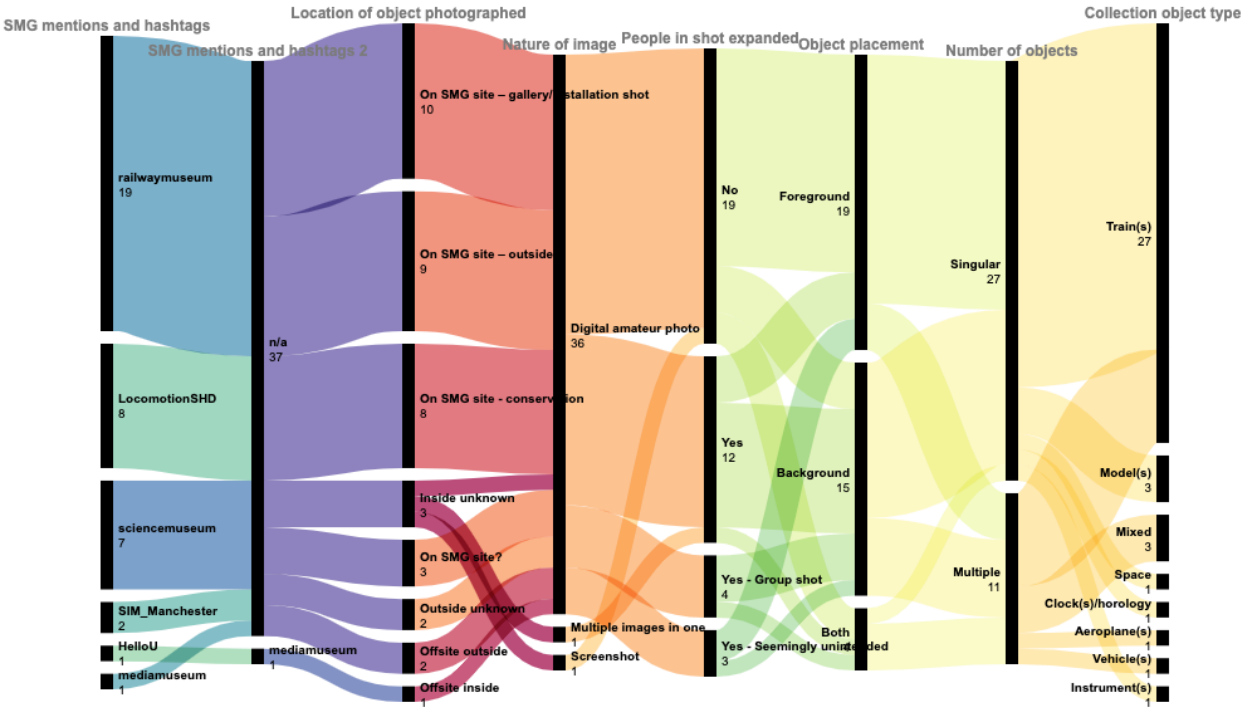

Figure 41 – Alluvial graph showing different visual coding of tweet images, specifically for images coded as "In process work of Museum Staff". This graph does not include retweets. The aim was to represent unique images; therefore duplicates were removed using the unique media identifier data field.

Figure 42 - tweet text: "Rocket looked stunning outside @railwaymuseum this evening". The image cited here has been redacted to prevent copyright infringement.

Some of the tweets in the dataset come from SMG staff. As outlined in the introduction for this chapter, data collection methods were designed not to collect tweets from official SMG channels, but this did not account for SMG staff tweeting from their own accounts. The image in Figure 42 may not obviously be museum staff work-in-process, but it was tweeted from one of the Group's curators, who often shared their work from a personal Twitter account. This image and tweet had the highest number of retweets of any of the 'In process work of museum Staff' posts, namely 16. It shows a working replica of *Rocket* being moved/driven by staff.[436] This staff member and Twitter user regularly tweets about their work; indeed 11 of the 38 original images come from this user. The engagement that they get shows that they have their own following and way of engaging with museum visitors. It is not an official museum channel, but it does showcase the work of the museum from an individual's perspective: 'So, we've got a lot of people [who work at SMG] who are really enthusiastic about sharing their work anyway, and social media is a great direct way for people to do that now.'[437] As they work for the museum it could be suggested that they might feel more comfortable tweeting directly at the museum using their handles and are therefore more likely to appear in the dataset. Figure 43, also tweeted by a SMG curator, shows the staging for photographing collection objects before an exhibition opens. It uses the official hashtag for the exhibition and tags the museum. Interestingly, it shows the staging and equipment that usually goes into professionally photographing collection objects. This contrasts with the shot itself, which seems to have been taken in a more candid way. The focus of the image seems to be the act of photographing the collection object, rather than the object itself. The focus of the tweet text seems to be the soon-to-be-opening

[436] 'Working Replica of Rocket | Science Museum Group Collection' <https://collection.sciencemuseumgroup.org.uk/objects/co205805/working-replica-of-rocket-steam-locomotive> [accessed 17 March 2024].
[437] Humphreys.

exhibition rather than the object in and of itself. The social media teams mentioned active members of staff on social media, indeed staff members who were interviewed themselves discussed tweeting humorously about the collection from their own accounts.

Figure 43 – In process object photography. Tweet text: "#HelloU preparations well underway. Opens 19 July @mediamuseum ??????? ? ✨? ☆???". The image cited here has been redacted to prevent copyright infringement.

Tweeted by the same curator as Figure 42, Figure 44 shows an engine in the conservation area at the Locomotion Museum site. This area is visible to visitors of the museum, as at the National Railway Museum but not the Science Museum, and National Science and Media Museum. This image is not so much showing behind the scenes as showing Twitter followers who might not physically be visiting the museum the ongoing conservation work happening there. It is possible to see the scaffolding, the paintwork that needs working on, and the way the windows have been protected for the painting to happen, even if no-one is physically present in the image. The tweet text does not explicitly say what work is being done, just that this is a new engine in the workshop at Locomotion. Figure 45 does show the work in progress by staff to transport *Stephenson's Rocket*. It is only possible to understand that it is *Rocket* from the tweet text, as the collection object is completely covered in order to be transported from one site to another.

This behind-the-scenes view is not normally something that museum visitors would get to see, and is tweeted from an account dedicated to the area of Manchester where the Science and Industry Museum is located. These images highlight the work that goes into maintaining the collection and displaying it so that people can visit it when fully installed.

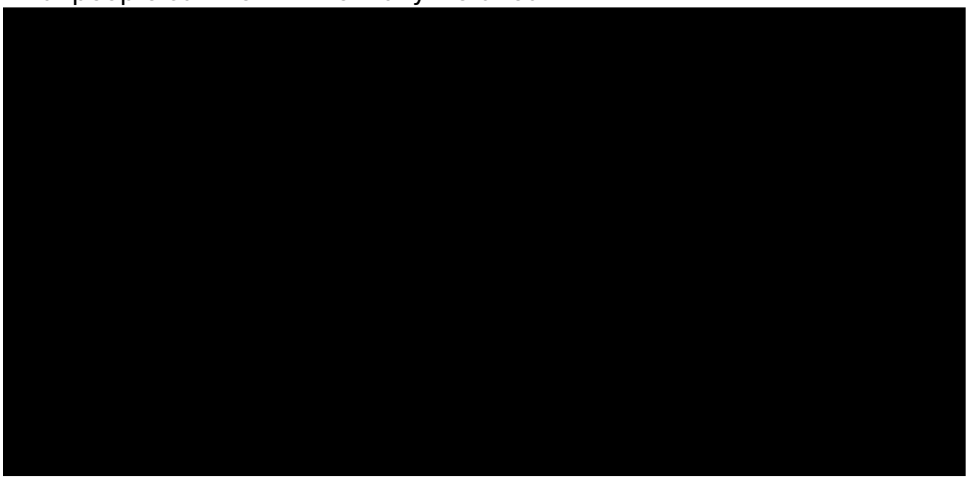

Figure 44 - tweet text: "A different green engine today in the workshop @LocomotionSHD". The image cited here has been redacted to prevent copyright infringement.

Figure 45 – Rocket packed and loaded on to a lorry outside Science and Industry Museum. Tweet text: "Bye bye Rocket it was wonderful to have you here these past few months @sim_manchester". The image cited here has been redacted to prevent copyright infringement.

Selfies

Selfies are another category of image found in the dataset. A selfie describes the process whereby a picture-taker holds the camera and takes a photograph of themself in the place/event. It is possible to recognize a selfie through the angle of the photo, the presence of the arm holding the camera in the photo and, most obviously, the face of the person who is the picture-taker and the subject of the selfie. The rise of selfies is tied to that of social media and other technologies that facilitate the easy taking and sharing of images. They have a performative aspect, showing the photo-taker's physical presence at a location or event. Selfies have been written about in recent academic literature,[438] and have been framed within both digital humanities work[439] and museum discourses.[440] Work by Dawson et al. looks at selfies as a practice of identity performance for girls aged 12–13 within the Science Museum, London.[441]

Selfies, although prevalent as a type of picture-taking on social media, only form 20 images in the dataset, out of a total of 1,513. This may be due to the

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[438] Tim Gorichanaz, 'Self-Portrait, Selfie, Self: Notes on Identity and Documentation in the Digital Age', *Information*, 10.10 (2019), p. 297, doi:10.3390/info10100297; Weng Marc Lim, 'Understanding the Selfie Phenomenon: Current Insights and Future Research Directions', *European Journal of Marketing*, 50.9/10 (2016), pp. 1773–88, doi:10.1108/EJM-07-2015-0484.

[439] Ana Clara and Oliveira Santos Garner, 'Stories We Tell Our Selfies' <https://papers.iafor.org/wp-content/uploads/papers/acah2017/ACAH2017_35043.pdf>; Ana Oliveira Garner, 'Selfies: Putting the "Me" into Media', in *Reconceptualizing the Digital Humanities in Asia: New Representations of Art, History and Culture*, ed. by Kaby Wing-Sze Kung (Springer, 2020), pp. 75–94, doi:10.1007/978-981-15-4642-6_5.

[440] E. B. Hunter, 'In the Frame: The Performative Spectatorship of Museum Selfies', *Text and Performance Quarterly*, 38.1–2 (2018), pp. 55–74, doi:10.1080/10462937.2018.1456673; Chiara Piancatelli, Marta Massi, and Andrea Vocino, '#artoninstagram: Engaging with Art in the Era of the Selfie', *International Journal of Market Research*, 63.2 (2021), pp. 134–60, doi:10.1177/1470785320963526; Robert Kozinets, Ulrike Gretzel, and Anja Dinhopl, 'Self in Art/Self As Art: Museum Selfies As Identity Work', *Frontiers in Psychology*, 8 (2017), doi:10.3389/fpsyg.2017.00731.

[441] Emily Dawson and others, 'Selfies at the Science Museum: Exploring Girls' Identity Performances in a Science Learning Space', *Gender and Education*, 32.5 (2020), pp. 664–81, doi:10.1080/09540253.2018.1557322.

nature of Twitter as a platform or the criteria used for defining the dataset for this thesis. In Figure 46 we see that selfies in the dataset have exclusively been mentioned, rather than included in bins with hashtags. They are most likely to have been taken at the National Railway Museum and then the Science Museum. Of the 20 images, 19 of were taken 'On SMG sites – gallery installation shot'. They were more likely to depict a singular collection object as part of the selfie. Unsurprisingly, the 'posing in/with' subcategory of 'staging of image' makes up just over half of the staging of selfies represented in the dataset.

Selfies are an act of self-representation and checking in. The Twitter dataset suggests that trains are most likely to be the collection objects people take selfies with. Similar to big-ticket objects, this could this be because of their imposing size. It might also reflect their fame and their stories as objects. A lot of these images have been taken on the sites of the museum, even though when we look at how trains are photographed in the dataset a lot of them are photographed offsite. So, as described by Suess, there is a break in the act of seeing/sharing here. Someone who looks at a train and tags an SMG handle is showing the museum that they have seen the train; someone taking a selfie with a train only tags an SMG handle when they are on site as an act of physically checking into a place. With two exceptions these images were all digital amateur photos, with no special staging or equipment, just posting and showing that they have physically been to a place and seen an object. They seem to be the photographic equivalent of saying, 'I've been here. I've seen this.' The act of looking at collections is more likely to be shared with the SMG collection on Twitter, rather than an image showing you were physically present with the object like a selfie. These images make up a small amount of the data Twitter dataset, but they are a contribution to the larger dialogue in academic literature about selfies.

The lack of selfies in the data set does not mean that no selfies with SMG collection objects are being taken, or even being shared on Twitter. There may be several reasons for the small number present in the data set, for example it could

be privacy concerns, but it could equally be the data collection methods used to create the data set. As the collection methods were limited to tweets with SMG handles and hashtags, users would have had to share the selfie with public channels and the online presence of the organisation. This will likely have limited the amount of selfies shared in this way. It could also be the case that people are hesitant to share pictures of themselves online, in the form of a selfie, for privacy concerns. However, as selfies are a popular type of digital image shared through social media, the relative lack of this type of image in the data set was likely an outcome of the data collection methods used. Therefore, data collection methods need to be considered when drawing conclusions about whether something's presence or lack thereof can speak significantly to user behaviour.

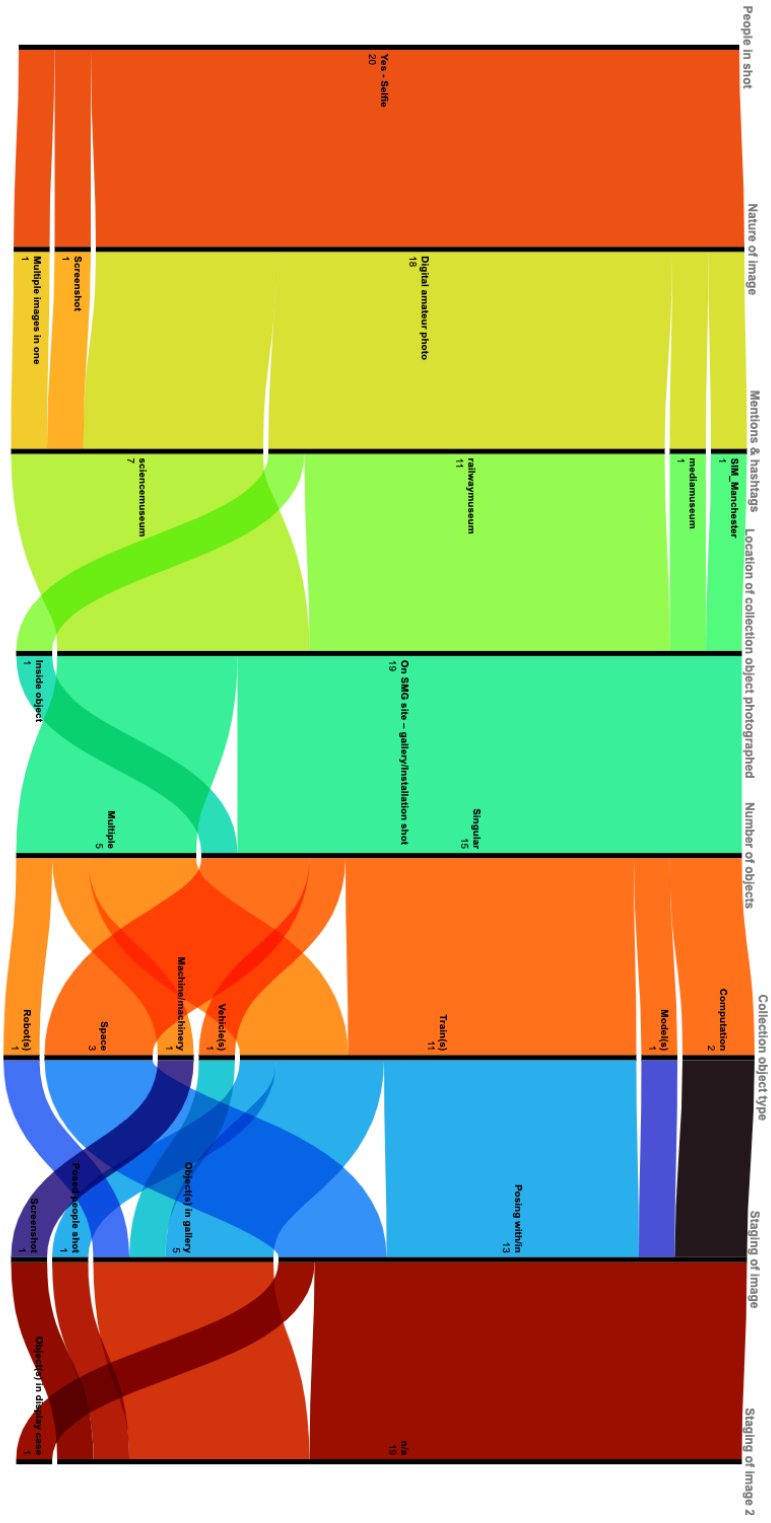

Figure 46 – Alluvial diagram showing visual content categories of Tweet images. Sub-category of 'yes-selfie' in 'people depicted' data field is focus for graph. This graph represents only physical sharing, therefore 'location of object photographed' data field 'n/a' has not been included here. Retweets have been included.

Physical encounters shared digitally through Twitter: conclusions.

The SMG collection objects in the dataset reveal both expected and unexpected findings. Firstly, the most frequently shared digital images on Twitter are of physically large and imposing collection objects. The story that the collection object embodies plays a significant part in that object being shared, and it does not have to be a conventionally aesthetically pleasing object. Due to the methods used for collecting tweets, i.e. using handles and hashtags instead of geo tagging, it was discovered that the SMG collection objects were being encountered offsite as well as onsite and these encounters were then being shared with SMG through social media channels. Of course, a lot of collection objects were encountered onsite, but interestingly they do not need to be inside SMG museum sites to attract attention. The affordances of Twitter mean that people can encounter the collection outside museum sites and share their experience through official museum hashtags and handles. The SMG presence, inclusive of digital channels and collection objects, is not limited to physical sites.

The affordances of Twitter as a platform have also shaped how the collection objects have been shared and recontextualised. Building on the findings of Suess, discussed earlier, images form part of documenting an SMG visit. Sharing them on Twitter is part of performative memory making. The affordances (e.g., character count) and social norms of Twitter are not really compatible with and therefore not likely to be adding to scholarship of objects (although exceptions to this include specialist accounts and crowdsourcing instigated by museums). Therefore, we are more likely to find personal reflections about a visitor's trip and/or their encounter with collection objects. Another social norm of Twitter is the importance of humour, and shared images are often recontextualised within humorous musings or larger in-jokes on the platform.

Twitter users wish to be seen as funny and encounters with the collection became part of this. The ephemerality of the platform affects sharing, both what is shared and how it is shared.

The nature of the digital images shared helps to convey how the collection is being recontextualised. The images in the Twitter dataset are overwhelmingly categorised as amateur photos. This would suggest that, when sharing the collection in image form through Twitter, the main concern is not necessarily to have the best quality image of an object but rather to share the encounter with it. Taking the photos was part of that encounter. The next chapter, chapter 4 – Digital encounters shared digitally: SMG collection images encountered digitally and shared through social media, will explore the meaning of the encounter with professional photos of SMG collection objects.

Chapter 4 – Digital encounters shared digitally: SMG collection images encountered digitally and shared through social media

Introduction

This chapter explores what digital encounters with images of SMG collection objects shared digitally through social media look like. Platforms of interest for understanding this behaviour include both Twitter and Pinterest and the chapter will explore the different iterations of sharing behaviour manifest on these platforms. What is tracked and analysed here are the shared digital representations of SMG collection objects as images that do not include a physical encounter with those objects. The digital images that form part of the digital surrogate will be explored, although not exclusively.

This chapter considers SMG collection objects that have been shared as digital images and then encountered digitally. These images are digital surrogates of the collection objects that are encountered in digital spaces, in this case social media and outside the physical sites of the museums. What is a digital surrogate? Why is that relevant here? How might these objects be more than a digital surrogate when encountered outside of the physical sites of the museum? There are many debates around digital surrogates and a key part of this is related to collection photography, as will be discussed in more detail below..

The methods used to analyse how digital encounters are taking place on and being shared through Twitter and Pinterest are a mix of quantitative and qualitative. Quantitative methods are used to identify areas to interrogate, followed by the application of qualitative methods to specific examples. It is

important to understand the shape of data. As Ahnert et al. note, '[...] all digital humanities projects should write steps into their work plans to think about how to interrogate the contours of their data.'[442] To understand where qualitative intervention is needed, it is first necessary to understand a dataset on a quantitative level. The shape and scope of the data on digital-to-digital sharing is introduced in graphs and tables, framed within interviews and illustrative or noteworthy examples of SMG collection objects shared digitally.

This chapter introduces how images of the SMG collection are encountered by and shared digitally by social media users. To do this, it first defines what digital collection images are, how they are produced, what their features are and finally, what systems they operate in. Particular attention is paid to their recognisable aesthetic, as well as SMG's approach to collections digitisation through photography as a reproduction technology. SMG collection documentation and staff interviews are used to understand SMG's policies and practices around collection photography. The chapter then looks at how digital images have been shared through Twitter, analysing a subsection of the larger Twitter dataset that has a digital location coded as 'N/A location', indicating that it is not possible to understand from the image alone the location where it was taken (for example, it could be an image of an existing photograph or a close-up image without context of the whole object). This analysis is undertaken to understand how the affordances of Twitter as a platform may have shaped image sharing. A substantial part of this chapter is dedicated to Pinterest because the platform it is built to facilitate the resharing of pre-existing images. The chapter will explore what SMG collection objects have been shared as images, and to what types of Pinterest board they are being shared.

[442] Ruth Ahnert and others, *Collaborative Historical Research in the Age of Big Data: Lessons from an Interdisciplinary Project*, Elements in Historical Theory and Practice (Cambridge University Press, 2023), p. 34, doi:10.1017/9781009175548.

Collection photography

If digital encounters can be shared digitally, how is this made possible through digitised collections? In these cases, images of the SMG collection are taken and published online by SMG to represent and describe their collection. Therefore, it is important to understand how collection photography is defined for this thesis. Through this understanding it is possible to recognise how collection photography is perceived hierarchically in relation to both the collection and to other images of the collection. What hierarchy of collection object images exists at SMG and how does this then affect the ways in which the collection object will be encountered as a digital image?

Museum collection photography has a specific aesthetic and SMG is no exception to this. If the collection object being photographed is 3D, there are particular ways in which it is photographed in order to be reproduced in the 2D medium. The resulting images end up having an aesthetic quality identifiable as collection photography. An interview with Richard Davis, a V&A photographer specialising in object photography, about the practice of museum photography suggests that all museums have a similar aesthetic when it comes to object photography: 'If you look across the world of museum photography now, you'll see most museums have adopted the principle of neutral backgrounds, because a coloured background will affect the colour of the object, either in general or just in certain areas.'[443] The images therefore have 'neutral backgrounds', with photographs of an object frequently taken from multiple angles, and one collection object catalogue entry can therefore be associated with multiple photographs published online. The collection object is removed from any visual context by this neutral background, and removed from a sense of scale by virtue

[443] Richard Davis, 'In the Photographic Studio', in *What Photographs Do* (UCL Press, 2022), pp. 271–83 (p. 275) <https://www.uclpress.co.uk/products/192312> [accessed 22 March 2024].

of the reproduction medium of photography.[444] Indeed, as part of the SMG's 'One Collection' digitisation project, there was a debate about whether to include scale rulers within the photography. Some curators were keen to include scale rulers in contrast to those who advocated that excluding them would be better for collections engagement.[445] Discussing V&A photography in Davis' interview, it is possible to gain an insight into collection photography processes: 'You don't necessarily need to know the history of the objects, but by understanding how they react under different lighting conditions and **having a photographer's eye**, you can know how you want the final image to look and how to achieve it'.[446] [My emphasis]. The photographic style could be understood as implicitly trying to covey both neutrality and authority. Visually representing collections in this way removes objects from their context, only for them to be recontextualised when they are added to the collections online website and described in the collection catalogue information.

The objects are posed and aesthetically recognisable as collection photography. This in itself is a recontextualisation. A key idea in the introduction to *Museum cultures of photography: an introduction* is that of *the* aesthetic 'posed photo', and there is a way of staging photos that comes from museum cultures and practices that has created an aesthetic.[447] This posing and aesthetic, rather than being neutral, communicates the museumification of those objects, and the values and assumptions that go with that. 'Knowledge about objects is made photographically: objects are 'posed' in the studio in ways that foster expectations of a museum and its objects – the exhibition poster in a bus shelter is as potent a space in this connection as an exhibition catalogue.'[448] This

[444] James Baker.
[445] Internal SMG sources.
[446] Davis, p. 283.
[447] 'Museum Cultures of Photography: An Introduction', in *What Photographs Do*, ed. by Elizabeth Edwards and Ella Ravilious (UCL Press, 2022), pp. 1–31 <https://www.uclpress.co.uk/products/192312> [accessed 22 March 2024].
[448] Edwards and Ravilious, 'Museum Cultures of Photography: An Introduction', p. 22.

would suggest the staging of the collection object in an image acts as an aesthetic thread, invoking the same values in different settings:

> Thus the 'poses' of objects, as sets of museum values, are spread photographically through the practices of collections management, gallery displays, digital asset management systems, publications, postcards, websites, publicity and fundraising campaigns which shape the perception of an institution.[449]

A unifying aesthetic of museum collection photography is created, through which the museum's values are implied, and these are spread through the different image hosting platforms of museums. The nature of the image and processing has changed from analogue to digital. However, the staging of objects against a neutral background does seem to have remained from when photography was adopted as a method of collections reproduction, as it has a close relationship with collections documentation practices.[450] This aesthetic and staging choice of a 'neutral' background can only apply to objects that are small enough in scale to be photographed against such a background or in a photo shooting tent.

SMG's collection is photographed in this 'museum aesthetic' unless the objects being imaged are large. The aesthetic of the collection images is recognisable. In relation to the photography conducted for 'One Collection': '[...] they're quite easy to recognise because they are these very simple, minimalist, white background shots, but they're great.'[451] The method of collections photography for 'One Collection' was atypical because the objects were being photographed rapidly and in-situ due to the deadline for the collection move to a

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[449] Edwards and Ravilious, 'Museum Cultures of Photography: An Introduction', p. 21.
[450] Fiona Rogers, 'Museum Photography: Now and Then', *V&A Blog*, 2023 <https://www.vam.ac.uk/blog/museum-life/museum-photography-now-and-then> [accessed 23 March 2024]; Sarah Kreiseler, 'Between Re-Production and Re-Presentation: The Implementation of Photographic Art Reproduction in the Documentation of Museum Collections Online', *Open Library of Humanities*, 4.2 (2018), doi:10.16995/olh.273.
[451] Humphreys.

new location.[452] This style of professional collection photography shows the collection at its best, '[...] but generally we're trying to use the photography that the professionals have taken, because it's on brand, it's lit properly, it's showing the object in the best light.'[453] This perception of 'best' is subjective to SMG, but similar collection photography is seen across museums. These images carry a value system with them. However, there are practical considerations when photographing collections, especially when attempting to produce a usable representation of 3D objects like those in the SMG collection:

> We want it to be clear what the object is, to capture as much of the object as we can, and for some objects – why can I never think of any examples out of 300,000 – like a book for example, you want the front cover and the spine hopefully of the book, probably that's what you want. For other objects which are 3D, they're not designed to be displayed [and] that can be quite difficult to capture. There are some objects in Blythe House which are massive as well – even by our medium standards – so for example we've got [a] Cambridge rowing 8 from the 1930s that's enormous, we've got dentist chairs, iron lungs, some really quite large hospital and medical equipment that is difficult photograph that was done separately on drop-down backgrounds. So the small pieces, especially when you've got hundreds and hundreds of things that are really, really similar, they can be done at great speed in the portable studios.[454]

If it is a visual representation and there is a need to communicate the different aspects of a 3D object to interested parties, and the large scale objects need to be contended with, there are going to be limitations or practical work arounds which affect the resulting image of the collection objects. It is not possible to achieve this neutral background aesthetic with all SMG collection objects because of their scale, although this may be the aspiration of staff because this is understood as a practice that would best represent them as understood by museums more generally and by the Group.

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[452] Internal SMG sources.
[453] Stanley.
[454] Humphreys.

The collection images exist in and are affected by a larger ecosystem of images within museums. In *Museum cultures of photography: an introduction*, Elizabeth Edwards and Ella Ravilious put forward the idea of photographs being a key part of the museum ecosystem, and that is central here. Being part of an ecosystem suggests that photographs are part of something larger; they suggest that different sites of 'photographic activity' are nodes in a larger museum photography ecosystem, each node with its 'own micro-cultures that mutually inform and conflict.'[455] Edwards and Ravilious suggest that these nodes have different practices and social norms, which make up the larger whole of photographic practice within museums. Building on Latour's ideas, they posit photographs as a part of processes that circulate and produce knowledge within the museum.[456] Photography is one part of the larger museum as a whole and reflects its values.

Collection photography is *of* the collection, but it is not *part* of the collection. It exists in relation to the collection, in a very close representative relationship to it, however it does not formally become part of it.[457] Although not part of the period of data collection, this close relationship and representational access role was heightened during the COVID-19 Pandemic. Given the lack of physical access to cultural heritage, inclusive of the SMG collections, like other UK GLAM collections, the digital collection became the only means for access:

> '[...] collection online and our website is our biggest shop front. It's wonderful that we get a million plus visitors to most of our museums a year, but the vast majority of people in the world will never come to the Science Museum, or the [National Science and] Media Museum, or the Railway Museum, it's just not possible. Any of them can come to the website and see the collection and research the collection, and work with it, as long as we have the material there

[455] Edwards and Ravilious, 'Museum Cultures of Photography: An Introduction', p. 2.
[456] Edwards and Ravilious, 'Museum Cultures of Photography: An Introduction', p. 2.
[457] Edwards and Ravilious, 'Museum Cultures of Photography: An Introduction', p. 2.

> and the photograph is really important for that and we're just learning that more and more.[458]

Lack of physical access does not mean lack of access if there are digitised collections. If we understand the collection as the Group, and the digitised collections as ways to visit the Group, the images of the collection becomes a key way to encounter the museum. However, literature suggests there is still a bond between the collection image and the collection item. 'The closer an image remains to something of perceived "material" origin, in line with Susan M. Pearce's emphasis of an object's sensory use within a "performative social dynamic", the greater its cachet.'[459] Collection photography or collection reproduction has a role to play in service to the material collection object.

Collection photography, although able to be freer and more accessible than collections, still exists in relation to them. Collections have been referred to as like the gold reserves in a bank;[460] museums need them in order to have legitimacy. Digital encounters shared through social media are framed largely in this thesis as social media users encountering these professionally taken collection photographs. So, then, what is the role that these professionally produced images have had ascribed to them by secondary literature? Susan Crane, cited in Edwards and Ravilious, suggests museum photography's role is to create a curated experience wherever the object, or rather object photograph, is encountered: 'Photography and photographs are active entities in every aspect of what it is to exercise "curatorship", museum practice and indeed policy, the latter because photographs, though unacknowledged, shape the structures which sustain museums as institutions and anticipate their visitors' encounters

[458] Humphreys.
[459] Catherine Troiano, 'Computations and Complications: Value Systems of Institutional Photography', in *What Photographs Do* (UCL Press, 2022), pp. 293–318 (p. 307) <https://www.uclpress.co.uk/products/192312> [accessed 22 March 2024].
[460] Dewdney, p. 75.

with objects.'[461] It could therefore be suggested that the museum meets people through the collection photography it produces, whether this is shared on or off museum owned platforms. The collection object has already been contextualised within its digital image representation.

SMG image policy

SMG have formalised their collections image publishing policy. Due to the 'One Collection' project, and the mass digitisation of the collection that this involved, as well as the collection engagement tools that were created around this time, the Group have formalised rules around publishing in to a 'living document'.[462]

> It's really as part of the 'One Collection' project that we've had to really formalize this stuff, so before that, these decisions were sort of made. I think ... broadly speaking there were probably policy documents, but it didn't become an issue because we weren't doing it at scale.[463]

Established but not formalised ways of dealing with collection images before the 'One Collection' mass digitisation led to reflection. The Group is a large organisation made up of multiple museums, and it was important to establish a workflow process. This formalisation can bring about a shift in the museum approach to or understanding of the importance of these digitised collection images; if a process has been formalised, it is by definition seen as important enough to do so.

The SMG's policy document provides insight into how they conceptualise their collection images and how the context for them should be controlled on

[461] Edwards and Ravilious, 'Museum Cultures of Photography: An Introduction', p. 6 Citing Crane 2020, 508.
[462] SMG, *When Not to Publish Images or Records Online: Guidance Document* (Science Museum Group, September 2020), pp. 1–7.
[463] John Stack, Interview with John Stack by Rhiannon Lewis, 2022.

museum platforms. The Group's goal is to publish images online, but the policy document does outline when this should not be done. It introduces exceptions:

> It is the Science Museum Group's goal that as many object records and photographs should be published online as possible. The vast majority of the Science Museum Group Collection images can, and should, be published online. Photography is one of the cornerstones of engaging the widest possible audience with our collection and increasing access to it. However, in some rare circumstances, it is not appropriate to publish a photograph of an object (or, even more rarely, an entire object record).
>
> Only a small handful of photographs are not appropriate for publication. More often, intelligent cataloguing to put an image into its proper context (for example, acknowledging a controversy around the image or someone associated with it) would be a more appropriate and transparent approach.[464]

The policy document outlines considerations for deciding whether or not an image of a collection object should be published online. There are a lot of collection objects with images in the SMG collection, resulting in considerable thought/work being involved in creating a policy that fits with so many edge cases.[465] The policy document (the version from September 2020 referenced here) outlines twelve reasons for image removal. There are nine that relate only to the digital image being published, and there are a further four which consider the object itself.

Image-only considerations for publishing images:

1. Copyright Restrictions
2. GDPR Restrictions
3. Culturally Sensitive Objects
4. Human Remains
5. Graphic, Obscene, or Disturbing Content
6. Racist/ Politically Sensitive Material

[464] SMG, p. 2.
[465] Stack, 'Interview with John Stack by Rhiannon Lewis'.

7. Objects that have been Damaged or Deteriorated
8. Objects with Obscured Photography

Object only considerations

9. Extreme Hazards
10. Short Term Loans In
11. Uncatalogued/ Un-accessioned Material
12. Deaccessioned/ Transferred/ Removed material

These considerations determine whether an object will have an image online; they do not determine the existence of a catalogue entry on collections online. This therefore means that these objects can still be researched, if someone were to come to the museum and look at them in person. However, their likeness/representative digital image will not be encountered on the online platforms of the SMG.

There are images of SMG collection objects in the Pinterest dataset that no longer have a picture in collections online, which would suggest that they were published online by the museum at some point and that decision was subsequently changed. These images are now still circulating outside of platforms that SMG has control over. An example of just such an image circulating on Pinterest, but which has been removed from SMG platforms, is *Turtle shaped amulet, North America*, which can be narrowed down to be one of four possible SMG objects,[466] all beaded amulets dated between 1871–1920,

[466] 'Turtle Shaped Amulet, North America, 1880-1920 | Science Museum Group Collection' <https://collection.sciencemuseumgroup.org.uk/objects/co103639/turtle-shaped-amulet-north-america-1880-1920-amulet-human-remains> [accessed 23 March 2024]; 'Turtle Amulet, United States, 1880-1920 | Science Museum Group Collection' <https://collection.sciencemuseumgroup.org.uk/objects/co103859/turtle-amulet-united-states-1880-1920-amulet-human-remains> [accessed 23 March 2024]; 'Amulet in the Shape of a Turtle, United States, 1871-1900 | Science Museum Group Collection' <https://collection.sciencemuseumgroup.org.uk/objects/co104384/amulet-in-the-shape-of-a-turtle-united-states-1871-1900-amulet-human-remains> [accessed 23 March 2024]; 'Amulet in the Shape of a Turtle, 1871-1900 | Science Museum Group Collection' <https://collection.sciencemuseumgroup.org.uk/objects/co108309/amulet-in-the-shape-of-a-turtle-1871-1900-amulet-human-remains> [accessed 23 March 2024].

attributed to the Sioux people. The image could not be matched with an SMG object record during the original object data analysis, but a potential match was found during a trip to the Wellcome Collection *Medicine Man* exhibition in London on 3 August 2022, which identified this object as one of several 'Protective amulets for children.' From interpretive text it is identified that they hold the umbilical cords of girls, which would suggest that the image was removed from SMG platforms as part of the policy on human remains.[467] This image has been circulated on Pinterest, and the Pinterest pin data note field had it at the time of collection described as 'Lakota umbilical fetish'. This has only been saved once as part of the dataset, and although steps have now been taken to address and rectify the issue on SMG platforms, it still circulates through Pinterest.

Who within SMG is seen as the ultimate authority on publishing images? As outlined previously, images are part of their own ecosystem in the museum, which is itself a knowledge production system.[468] As formalised in the policy document it is curators (including keepers) who have ultimate authority over what images get published: 'And so doing it at scale meant we have to revisit all of the policies, what's being published, who can tick the box, what things don't get published.'[469] Responsibility for the decision to publish or not publish sits with curators, but there are others involved in the process.[470] Photographers, for example, make a call about whether to take/create a photo for one collection if this is not requested by curators.[471] The decision defaults to conservation if hazards are involved.[472] There are many actors in SMG who have input into whether an image can be published, as explored further in Chapter 5.

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[467] Wellcome had it's own policy for human remains, this was explained further in the interpretation explaining why there was only interpretative text for 'Tsantsa (shrunken head)' displayed. *Citing International Council of Museums Ethical Code, article 4.3.*
[468] *What Photographs Do*, ed. by Elizabeth Edwards and Ella Ravilious (UCL Press, 2022) <https://www.uclpress.co.uk/products/192312> [accessed 20 March 2023].
[469] Stack, 'Interview with John Stack by Rhiannon Lewis'.
[470] SMG, p. 2.
[471] SMG, p. 2.
[472] SMG, p. 2.

Tools like the Random Object Generator and Museum in a Tab have led SMG staff to reflect on the images that have been published on and made available through collections online. Museum in a Tab (MIAT) is a Chrome web browser extension,[473] launched in 2019, that shows images of the SMG's collection along with their title and a prompt to share the image to a selection of social media channels.[474] The browser window is divided into two, with the object image on the right and contextualizing information and mechanisms for sharing on the left. There is also a line that situates the image of the object in the broader collection: 'One of 7.3 million items in the Science Museum Group Collection.'[475] MIAT was made by Digital team members using the online collection API:[476] 'Museum in a Tab, which every time you open a new tab gives you a new photograph, in a new tab, and the option to click through to the record.' [477] Then, the Random Object Generator (ROG) is a web page designed by the SMG digital team in 2018 to display a new and different collection object from SMG collections every 15 seconds.[478] It came about from work done at an SMG Collections Remix event.[479] A large image of the collection object fills the browser window, accompanied by object title and collection object number in the top left

[473] 'Museum in a Tab - Chrome Store', *Chrome Web Store* <https://chromewebstore.google.com/detail/museum-in-a-tab/> [accessed 24 September 2023] Also works on firefox and Safari .
[474] Pinterest, Twitter, Facebook
[475] Will Dave, 'Museum in a Tab', *Science Museum Group Blog*, 2019 <https://blog.sciencemuseumgroup.org.uk/museum-in-a-tab/> [accessed 24 September 2023].
[476] 'TheScienceMuseum/Collection-Chrome-Extension' (The Science Museum Group, 2023) <https://github.com/TheScienceMuseum/collection-chrome-extension> [accessed 23 September 2024].
[477] Humphreys.
[478] Jamie Unwin, 'Random Object Generator', *Medium*, 2018 <https://lab.sciencemuseum.org.uk/science-museum-random-object-generator-7b4c960ace9> [accessed 24 September 2023].
[479] John Stack, 'Reflections on SMG Collection Remix | Science Museum Group Digital Lab', *Medium*, 2018 <https://lab.sciencemuseum.org.uk/reflections-on-smg-collection-remix-9f974e9e6e8a> [accessed 24 September 2023].

of the browser.[480] The ROG can also be used as a screensaver.[481] The act of encountering the collection objects, one by one, outside of Mimsy or the collections online space allows SMG staff to view an image/object from a non-staff perspective and to reflect on what it means for the image to show up outside the context of the museum (museum here is inclusive of museum-owned platforms). The use of these tools by SMG staff has led to reflection, which in turn has led to image policy changes:[482]

> Some categories we don't publish – photographs of human remains. We published the records but we generally don't publish photographs, that's to keep them out of things like Museum in a Tab and Random Object Generator. **We don't want them appearing out of context** because it can be distressing to some people and generally … the ethical direction that museums seem to be moving in, is that you don't have human remains front and centre, images of them, they are accessible if you wish to see them, you absolutely can, but you need to take the extra step.[483] [My emphasis].

The ROG and MIAT have made staff reflective both about what is and is not a museum context (explored further in Chapter 5) and about how the museum might contextualise its objects. There is the assumption that they [ROG and MIAT] will be used by teachers, and therefore the perceived audience is school children.[484] Education is the expected default of the museum context here. Freedom of access is not, however, placed above all else - the museum is a holder of objects, and it tries to do this ethically. This is not just about what is culturally sensitive content or content with legal restrictions. Museums want to be presented in a certain light online, and this includes not allowing images to go online that may be seen as offensive.[485]

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[480] 'https://collection.sciencemuseumgroup.org.uk/search/slideshow', *Random Object Generator* <https://collection.sciencemuseumgroup.org.uk/search/slideshow> [accessed 23 September 2023].
[481] Unwin.
[482] Humphreys.
[483] Humphreys.
[484] Humphreys.
[485] Humphreys.

Not all collection photography is created equal, or at least not all collection photography is perceived as being equal in value to museum staff. There are different types/standards of collection photography and these have different statuses. There is record photography, the minimum standard for all images of collection objects going online; then there is enhanced photography which takes more time, requires more equipment and produces what is perceived as a better image:

> So, there's what's known as sort of the record photography, which is [of an] object with a sort of creamy grey black, cream grey background. And that is kind of a single shot of the object taken so you understand what it is. And as a minimum all the objects that we're moving as part of the 'One Collection' programme, and generally new acquisitions, will have that level of photography so there is a picture of it. So, often that's the only image that we've got and that's the one we have to work with, and they are good enough to share. It's great that we've got them, but there are other levels of enhanced photography where the photo studio have taken an object and properly lit it, or perhaps put it on a turntable, or done 360-degree photography.[486]

These are the types of collection photography that are designated by the museum as being good enough to appear on SMG platforms to represent the collection. In the first part of the quotation you understand they have a similar type of aesthetic, as outlined before. Although record and enhanced photography could have similar aesthetics, as long as they are images (photogrammetry and gigapixel images are out of the scope for this thesis), interviews suggest that SMG is only willing to use images on its platforms that have been professionally photographed. Although record photography has been used extensively for 'One Collection', the preference is for enhanced photography, '[T]hat sort of enhanced photography that is featured on the collections websites and in blog posts on

[486] Stanley.

social as well.'[487] This enhanced standard of photography is considered the best and is how the Group prefers to share and represent its collections digitally.

There is a hierarchy of what is considered a good image at the Group. The SMG does not represent its collection with non-professionally taken photographs, although there are some exceptions. Images of individual collection objects are taken by professionals even if at the record photography level. 'One Collection' has demonstrated these preferences and working practices:

> But their [National Maritime Museum] view seems to be a photograph is better than no photograph. I would be inclined to agree, and I wouldn't be surprised if one day we change our minds on that, but 'One Collection' has also kind of made that moot because the majority of the collection will now have a professional photograph ...[488]

'One Collection' photography practice reflects what SMG perceives as important. The National Maritime Museum has a policy for collections photography inclusive of non-professional photography. The National Maritime Museum's collection is smaller but resembles part of SMG's collection. As noted in the quote above, their image policy aims to have a representative image of all collection objects, even if this means sacrificing the quality of the images that are publicly accessible. These images do exist at SMG but they are held within the collection management system (Mimsy) for staff reference only.

> So, what we are trying to assure is that none of the images that, say, are on Mimsy because a curator was just in stores and took an image, is really useful to have ... as a point of reference. I mean the ultimate goal would be to have all the high-end digital assets on our Mimsy system as well. The structure we try to create is a realistic one knowing that we ... will never have enough resources to digitise every single object in our collection, especially retrospectively.[489]

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[487] Stanley.
[488] Humphreys.
[489] Geoff Belknap, Interview with Geoff Belknap by Rhiannon Lewis, 2020.

In the aspirations of the Group's staff, we understand what the museum is willing to hold and this affects its internal work processes and what the museum is willing to share publicly. Purposefully taken collection photography is shared '[t]hrough official channels'.[490] There is an aspiration to digitise all objects, because then they would be accessible, and making the collection accessible is the ultimate goal. Making objects accessible, however, is always at the discretion of museums and they determine the form in which this will happen.

'One Collection' was illuminating for SMG values, especially regarding the production of collection photography. A hierarchy of what makes a good SMG collection object image became clear from staff interviews. Although the output largely appeared after the period of data collection, 'One Collection' was happening concurrently with the writing of this thesis. 'One Collection' is a major SMG Group-wide initiative for the transformation of the care, storage and documentation of SMG collections.[491] The SMG needed to move a large part of its collection out of the stores at Blythe House, and these would be rehoused at the new Building One at the National Collection Centre in Wroughton (SMG have been in possession of this site since 1979)[492] 'One Collection' had a bigger scope than just the collection move; it also encompassed collection digitisation, and therefore collection photography. There were time constraints because of the deadline for the physical move, but staff also desired 'quality' digitisation:[493] the collection move could have taken place irrespective of the mass digitisation, but the mass digitisation was considered critical to SMG in other ways.[494] 'You could have other criteria for digitisation [previous examples given include heritage at risk, public interest, scholarship and research]. So, because [in] this project ['One

[490] Humphreys.
[491] Science Museum Group, *INSPIRING FUTURES: STRATEGIC PRIORITIES 2022–2030*, 2022 <https://www.sciencemuseumgroup.org.uk/sites/default/files/2023-10/Inspiring-Futures_2022-2030.pdf>.
[492] Adrian Murphy.
[493] Humphreys; Stack, 'Interview with John Stack by Rhiannon Lewis'.
[494] Humphreys.

Collection'] time was the kind of driving factor, and there was limited money, then it was like scope is the thing that flexes.'[495] Within these various constraints, SMG have tried to make the most of the digitisation opportunity of the 'One Collection' project.

Over several decades, collection images have been created as part of different collection digitisation initiatives, which then populate SMG collection images repositories, and prior to 'One Collection', approaches had evolved in different ways in different museums in the Group. There is a hierarchy within the SMG's image systems as to where to source an image from for online publication. In interviews with SMG staff the perception of where it is best to source images from varies between staff members and museums. However, the fact that the images should be sourced from one of these image repositories and not taken by staff using their own devices does not change, with the exceptions being if there is not an image of a collection object,[496] or where the required image is not classed as a collection object but is collection/museum related ephemera.[497]

There are three main SMG image repositories that hold collections photography, in addition to people taking their own. Collections online is accessible to anyone with an internet connection and browser and pulls collections information from Mimsy. A lot of but not all records have an image and these are generally published under a Creative Commons licence. Creative Commons, specifically Creative Commons Attribution-NonCommercial-ShareAlike (CC BY-NC-SA 4.0),[498] is the default image licence for the SMG images. The Science and Society Picture Library (SSPL) hosts high quality images

[495] Stack, 'Interview with John Stack by Rhiannon Lewis'.
[496] Campbell-Payne.
[497] Humphreys.
[498] 'CC BY-NC-SA 4.0 Legal Code | Attribution-NonCommercial-ShareAlike 4.0 International | Creative Commons' <https://creativecommons.org/licenses/by-nc-sa/4.0/legalcode.en> [accessed 23 March 2024].

that have copyright restrictions that are available for licencing. These can often be used by SMG staff, but not all image intellectual property (IP) is held by The Board of Trustees of the Science Museum (SMG's legal entity).[499] Researchers and other external people can use these images for a fee. The Media Library is an SMG internal repository of images to which not even all staff have access. It has high quality images of collection objects. There are different hierarchies of what is perceived as the best place to source images from these different image banks. The view that Collections Online comes at the top of that hierarchy, with SSPL in the middle and simply taking pictures at the bottom is shared by a couple of staff members,[500] while others use SSPL to source collection images.[501] Science Museum staff like to share images from the Media Library.[502] Object images are not just sourced from collections online, they are part of a larger ecosystem of images in the museum:

> We have an internal Media Library, that is meant to be the single source of object images and for images in general that the Group uses. And that is managed by the photography team – that are Group wide – but other colleagues can add other images to it. But for image objects in the collection they [are] generally all photographs taken by our photography teams uploaded to the Media Library, and then linked to, and then they're searchable by object number and various kind of tags. So that's the first port of call. Those images are pulled through to the online collection, sort of automatically, so often I'll actually go to the online collection because it's easier to find the object, and then [I] would go through to the Media Library to download the image if I needed a particularly high resolution of the object. The online collection has images that are of a medium resolution that are available to download for anybody. So, that can be quicker sometimes to, to get the image. Occasionally we'll have images taken by people on their phones of an object, often that's if its newly joined the collections, not been kind of officially photographed yet, so sometimes we will use those images in, for example, a blog post or on social media. But generally we're trying to use the photography that

[499] Some works are still within the copyright of the original maker, therefore cannot be included in the Creative Commons default CC BY-NA-SA.
[500] Campbell-Payne; McNaught.
[501] McNaught; Randall.
[502] Stanley.

> the professionals have taken, because it's on brand, it's lit properly, it's showing the object in the best light.[503]

Images that are professionally taken and of high quality are seen as being at the top of the SMG collection image hierarchy. They are of better quality, seen to be 'on brand' and represent the museum through the collection object images. Here, we see a distinction between collection photography produced and used by the museum that is largely what is represented in the digital-to-digital encounters and the collection object images that make up the physical-to-digital sharing, that capture an encounter with an object.

How does SMG understand and feel about the act of sharing an image of their collections? SMG Digital Director John Stack described enabling the sharing of museum content:

> That if you open things up, they generate societal good by being open and being used and reused out in the world. And so, the link to the kind of social sharing thing is, even if you're just sharing an image, that's still a valuable thing to do. You're still saying something about it. Even if all [you] do is paste the URL and to say 'look'. If you say something more than that, that's great, but that kind of putting it out into the world, actively allowing and therefore implicitly encouraging reuse of the content, is how museums deliver their missions in the 21st century.[504]

In this we see that putting the collections online, connected to a social media platform with affordances for sharing content, means that the collections will be shared online, something that happened very early on with *Brought to life* content circulating on Pinterest. How and in what form the collections are shared and recontextualised is outside of the museum's control. The aesthetic form of the collection image is something the museum has control over, and what metadata is automatically pulled through in the act of sharing can also be implemented,

[503] Stanley.
[504] Stack, 'Interview with John Stack by Rhiannon Lewis'.

although this does not have to be followed. SMG has put in place infrastructure that supports collection sharing – collections online, collection engagement tools, digitisation as part of the 'One Collection' project, pulling through further object information when sharing through social media platforms. This infrastructure, as well as enabling this thesis to research how their collections are being shared online, all denotes an appetite to understand sharing collections online. Is this out of a desire for control or is it to better facilitate digital infrastructures that support collection sharing in the future? It is likely that both of these are factors, according to different priorities and actors in the museum. Just as there are still multiple platforms from which collection object images can be sourced and shared online from within the museum, there are different actors in SMG with agency over different aspects of the Group.

On Twitter

Digital encounters with SMG collection images shared digitally are present in the Twitter data collected for this thesis. Twitter enables you to not only share from a physical encounter, but also to reshare images already in existence, therefore facilitating a digital-to-digital encounter. The affordances of Twitter are different to those of Pinterest; the ways in which an image is re-shared differ. It could be argued that retweets and people sharing links are also resharing images, therefore creating a digital-to-digital encounter. However, this is not how they have been framed in this thesis. When people share a link on Twitter, if the website it is sourced from is set up in this way, an image will pull through from the web page into the tweet. SMG collections online is set up to pull through a collection image if you share a link. So, from the Twitter user's perspective, a collection image could have been encountered as an embedded link on their timeline. However, the way that the tweet metadata was cleaned for this thesis only images that had an uploaded image as media were included in the dataset. Therefore, links that potentially had an image included when encountered

through the Twitter user interface were not included as part of the dataset. Retweets were included in the physical encounters shared digitally chapter to understand the use/spread and reach of these initial physical-to-digital encounters (see Chapter 3 – Physical encounters shared digitally: in person encounters with the SMG collection). To understand the digital-to-digital encounter on Twitter, this dataset used images that were tagged as N/A by the researcher for their location. The N/A location subsection of the larger Twitter dataset includes 281 tweets, with some retweets.

Key concepts for image sharing in this section are the ideas of beauty and humour, both of which are subjective culturally and personally. This thesis does not seek to define either concept, rather to suggest that images may be produced

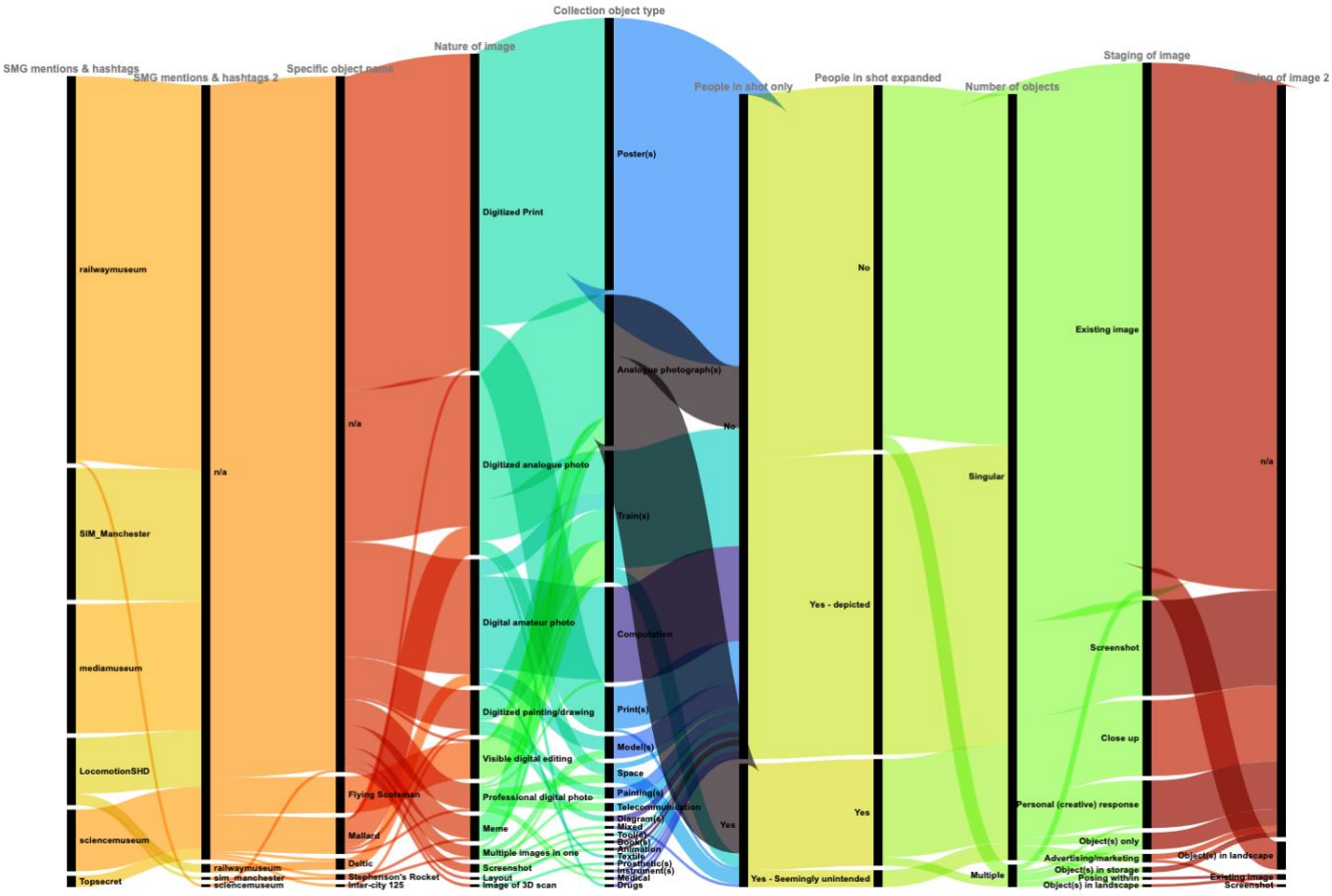


Figure 47 - Alluvial graph of N/A locations from Twitter dataset.

to enact these concepts and this may be part of the reason why an image, and by extension a collection, gets shared through Twitter.

These images in the dataset are most likely to come from the NRM, although notably there is representation from all the handles of the museums in the Group. Only one hashtag – Topsecret – was represented. Largely these images do not contain people: there are 44 that have people in them but 237 of the 281 do not. However, if we look at 'people expanded section', a visual coding category for the Twitter dataset which has greater detail on how people have appeared in the images in the dataset (see Appendix 3 – Table of categories for coding digital tweet images), around half of the images that do not have anyone in them are depicting a person or people. Overwhelmingly, these N/A images depict a individual object: 273 of 281. The alluvial visualisation in Figure 47 shows the most likely image type to be digitally encountered would tag the NRM handle; it would not feature a specific object; it would be a digitised print of a poster; it does not feature people; it would be of only one collection object; and it is likely to be an existing image. There are 96 tweets in the dataset that match this description, representing five unique digital images of the SMG collection objects. The three below were shared multiple times. They are all of railway poster artwork in the SMG collection by the same artist, and all come from the same Twitter user, a historian specialising in art history and cultural heritage. These were all tweeted as individual images with a small description. The most shared collection object is *Southend* by Wilfred Moody Fryer (1957) shown in Figure 48.[505] This digital image of the poster artwork for British Railways (Eastern Region) originally appears in the dataset 53 times as retweets, which were shared between 18 June 2019 and 7 September 2019.

[505] 'Southend | Science Museum Group Collection' <https://collection.sciencemuseumgroup.org.uk/objects/co227026/southend-painting-oil-painting-poster-artwork> [accessed 23 March 2024].

Figure 48 - Science Museum Group. Southend. 1977-5759 Science Museum Group Collection Online. Accessed 15 March 2023. https://collection.sciencemuseumgroup.org.uk/objects/co227026/southend-painting-oil-painting-poster-artwork. © The Board of Trustees of the Science Museum, under a CC BY-NC-SA 4.0 Licence. In the dataset 53 times, all RTs.

Figure 49 - Science Museum Group. Weston super Mare. 1978-1492 Science Museum Group Collection Online. Accessed 15 March 2023. https://collection.sciencemuseumgroup.org.uk/objects/co227334/weston-super-mare-painting-visual-work-poster-artwork. © The Board of Trustees of the Science Museum, under a CC BY-NC-SA 4.0 Licence. In the dataset 26 times, 25 times as RTs.

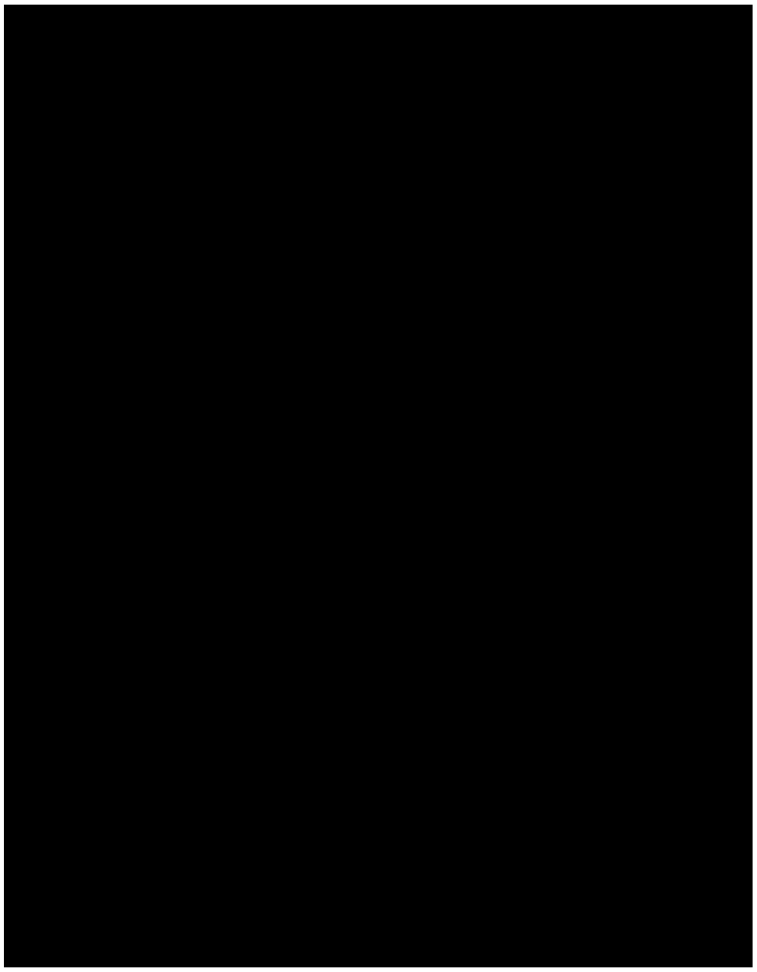


Figure 50 - Cromer, Artwork for British Railway Poster. (Currently not findable on Collections online - sourced from Tweet) Wilfred Moody Fryer, 1960. This digital image appears in the dataset 14 times, 13 times as RTs. The image cited here has been redacted to prevent copyright infringement.

The images all depict original artworks from British Railways, two by the same artist, Wilfred Moody Fryer. The two that there are records for are from the Pictorial Collection (Railway) category of the collection. These are paintings produced to be part of advertising campaigns for British Rail to encourage people to travel by rail to English seaside destinations. They literally paint a pretty picture of going to the coast – specifically seaside towns with a railway station, with bright colours and with happy people in 1950s attire. Two of these images depict families on their days out, the other a Marilyn Monroe-esque figure seemingly very happy to be at a lido in Weston-super-Mare (see Figure 49). These are meant to be appealing images, encouraging people to use British Rail services. They have been digitised by SMG and then shared through Twitter. These reproductions depict the original advert artworks, but do not yet include any advertising slogan, therefore possibly suggesting that they are being shared for their aesthetic quality. However, these images originate from an

account by a subject specialist, all the tweet descriptions give tomb stone information about the objects (i.e., maker, artwork from whom) and they are tagged as originating from NRM. The tweets contain only factual information. The tweeter does not pass any kind of judgment, but that there was popular appreciation for these images is indicated by the number of retweets they received. Aesthetically pleasing images, framed factually and linked to NRM, benefit from numerous retweets.

These advertising images can be framed as more than aesthetically appealing; they could be seen to embody nostalgia. Professor Janelle L. Wilson, when considering nostalgia, labelled it as emotion,[506] with the potential to be a collectively felt,[507] a recollection of when things were "good".[508] Nostalgia has also been described as the repackaging of a sanitised history for marketable consumption.[509] In *The nostalgia of organisations and the organisation of nostalgia: past and present in the contemporary railway* industry Tim Strangleman discussed nostalgia's use by privatised railway companies during different governments. He suggests that: 'The railway industry is perhaps one of the most fruitful for exploring notions of nostalgia because of its place within the nation's psyche.'[510] Indeed, Thompson's thesis, specifically looking at railways posters, proposes that they were used to market a "tourist utopia":[511] '[s]uch a term [tourist utopia] has been coined in an attempt to express the collective unreality of the tourist landscape as portrayed in material designed to entice people to travel long distances to see it and to part with money for the privilege of

[506] Janelle L. Wilson, '"REMEMBER WHEN…": A Consideration of the Concept of Nostalgia', *ETC: A Review of General Semantics*, 56.3 (1999), pp. 296–304 (p. 297).
[507] Wilson, p. 303.
[508] Wilson, p. 297.
[509] Tom Vanderbilt, 'The Nostalgia Gap', *The Baffler*, 31, 2016, pp. 6–7 (p. 6).
[510] Tim Strangleman, 'The Nostalgia of Organisations and the Organisation of Nostalgia: Past and Present in the Contemporary Railway Industry', *Sociology*, 33.4 (1999), pp. 725–46 (p. 729).
[511] Josef Evan Matthew Thompson, ''A Master Whose Heart Is in the Land': Picturing the Tourist Utopia of the Great Western Railway,' (University of York, 2011), p. 21.

doing so.'[512] In this way it is possible to understand the duality of the posters, as trying to market an ideal "tourist utopia" at their time of their creation and now as images shared through Twitter to evoke emotions or a collective emotion for a time that never was.

SMG collection images encountered and shared digitally through Twitter are most likely to be existing images. 'Staging of the image' is the image coding category for the Twitter dataset that describes the arrangement of how the picture has been taken rather than the content of the image. (See Appendix 3 – Table of categories for coding digital tweet images for further visual coding categories and subcategories). 'Staging of the image' is an image code that was then represented by two data fields – staging 1 and 2 – so as the capture the different types of staging that may have been present in one image. These 'staging of the image' data fields 1 and 2 were then combined below in Table 7. In the table it is possible to see that over half of all the digitally shared images in the dataset represent existing images. The next largest percentage is screenshots; however, these make up only 11.9% of the 'staging of the image' dataset. This is followed by 'close up', which has been included in the N/A location dataset as the photograph was taken so close to the object that we lose the ability to assess location. It is possible that these images were taken from a physical encounter, but it was not possible for the researcher to assess this from sight alone. Most likely SMG images without a location will be existing images, that is, images of SMG collections that already existed then were digitised.

Table 7 – Percentages of 'staging of image' subcategories, from merging of staging 1 & 2 fields. To demonstrate overall representation of the staging of image subcategories in the Twitter dataset.

Staging of image code	**Percentage of staging 1 & 2 fields**
Existing image	65.3%
Screenshot	11.9%
Close up	9.2%

[512] Thompson, p. 30.

Personal (creative) response	5.8%
Object(s) in landscape	3.7%
Object(s) only	2.0%
Advertising/marketing	1.0%
Object(s) in storage	0.7%
Posing with/in	0.3%

'Personal creative response' to the SMG collection is shown through edited images that include collection objects. Although only a very small part of the dataset (17 tweets in total including retweets), 'personal creative response' as images of collection objects are a different type of digital encounter. These are digital images of the collection objects that have been changed through that encounter. The affordances of digital images mean that they can be edited, altered and shared. The two figures below show Twitter users taking parts of one image and editing them into another. Figure 51 is a retweet of a tweet from the @SIM_Manchester account, which is in conversation with another Museum account, @MERL, famous for its popularisation of the 'absolute unit' meme.[513] Here the Twitter user has edited a painted cow into James Nasmyth's 1871 oil painting, *A steam hammer at work*.[514] The implication of the image presumably being 'absolute unit of a bull vs. 19th century steam hammer engineering'. Both bull and steam hammer are depicted in digitised collection objects and have then been edited together and shared using the affordances of Twitter and digital image editing technologies for a humorous conversation between museum social media accounts. This took place in a digital public space, where other Twitter users could then encounter the conversation, potentially sharing it, which is how it ended up in the dataset. The collection objects are encountered in this humorous way. The humour described by SMG museum staff for their social

[513] Arran Rees, 'Remixing Museology: An Approach to Collecting Social Media in Museums', pp. 187–210.
[514] 'A Steam Hammer at Work | Science Museum Group Collection' <https://collection.sciencemuseumgroup.org.uk/objects/co46233/a-steam-hammer-at-work-oil-painting> [accessed 23 March 2024].

media tone extends beyond simply the tweet text into potentially all content shared by the museum through Twitter. However, the text tone here is also humorous, reassuring Twitter users that '(no cows were harmed in the making of)' this tweet image.

Figure 51 – Edited image depicting a cow in a painting of a steam hammer. The image cited here has been redacted to prevent copyright infringement.

The Image in Figure 52 is an edited combination of different SMG collection objects. Again, in the same way as Figure 51 this originated from the @SIM_Manchester account but has been shared through retweeting by other Twitter users. The humour of the image is only expressed when contextualised within the tweet text, here (edited): "#UnlikelyFirstWordsOnTheMoon Told ya we should have taken the train, Buzz! #Apollo50 #Apollo11". Here two digital images of SMG collection objects have been edited together: a NASA image of Buzz Aldrin walking on the moon and an image of Stephenson's Rocket.[515] These two

[515] @NatGeoUK, 'A Brief History of Moon Exploration', *National Geographic*, 2020 <https://www.nationalgeographic.co.uk/space/2020/07/a-brief-history-of-moon-exploration> [accessed 23 March 2024].

collection objects are encountered in this edited digital image where SIM Manchester is joking about possible methods of travel to the moon, using unlikely but popular SMG collection objects. Like the first example, this can be seen as funny on a surface level - you cannot travel to the moon by train – but has further levels of meaning if a Twitter user knows that it was tweeted for the 50th anniversary of the Apollo 11 moon landing.[516]

These images and their tweet text, like other digital images on Twitter, are humorous. There are layers of understanding to the humour. You may have to be aware of the original joke to find the subsequent images/tweets funny, but this is a social behaviour expected on the platform. SMG staff are aware of this and employ it as a way for Twitter users to encounter the collection not only in a new context of Twitter but in a new contextual tone, that of humour.[517] These were digital images or digitised images of the collection before they were edited to create these new 'personal creative responses'. From the percentages of the staging of the images of the dataset, shown in Table 7, this is largely made up of 'existing images.' In order to understand and contextualise what those existing images are, the 'nature of the image' visual coding category which looks at the format of the image shared through Twitter is further explored later in this chapter.

[516] 'Apollo 11: The Moon Landing' <https://airandspace.si.edu/explore/stories/apollo-11-moon-landing> [accessed 23 March 2024].
[517] Campbell-Payne; Randall; Humphreys.

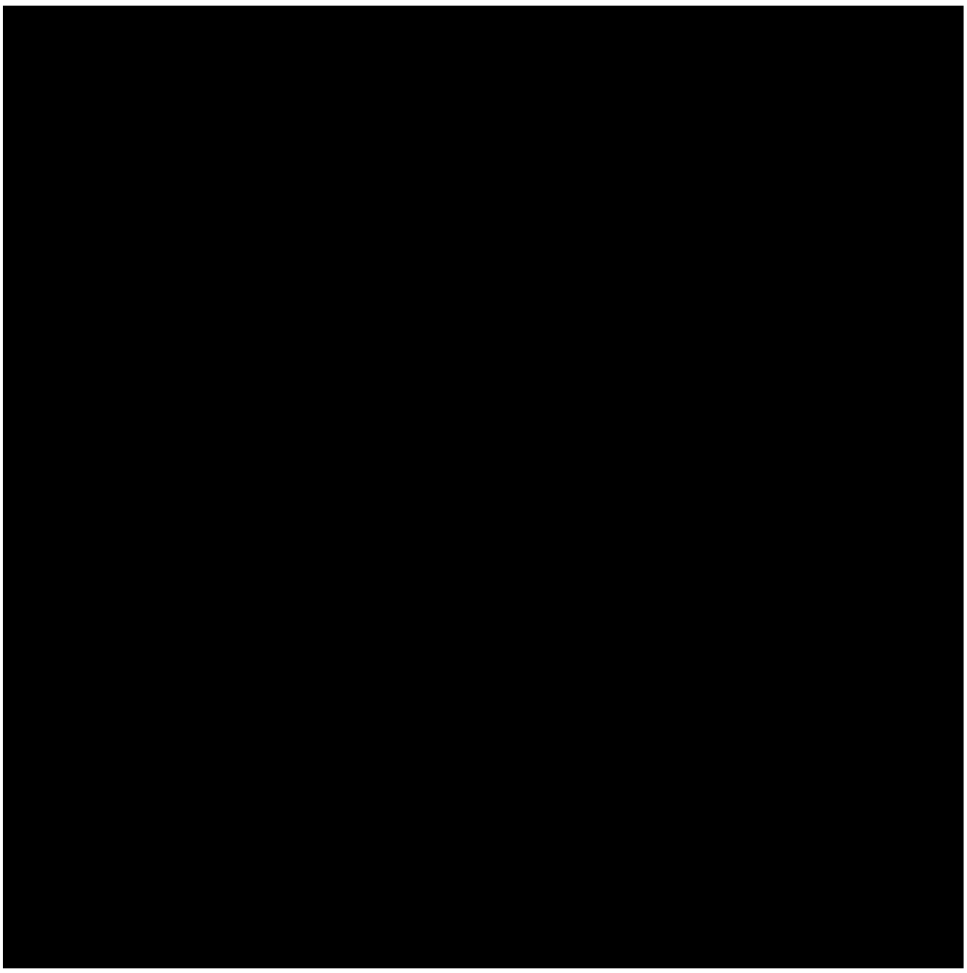


Figure 52 – Edited image of Stephenson's Rocket on the moon with Buzz Aldrin. The image cited here has been redacted to prevent copyright infringement.

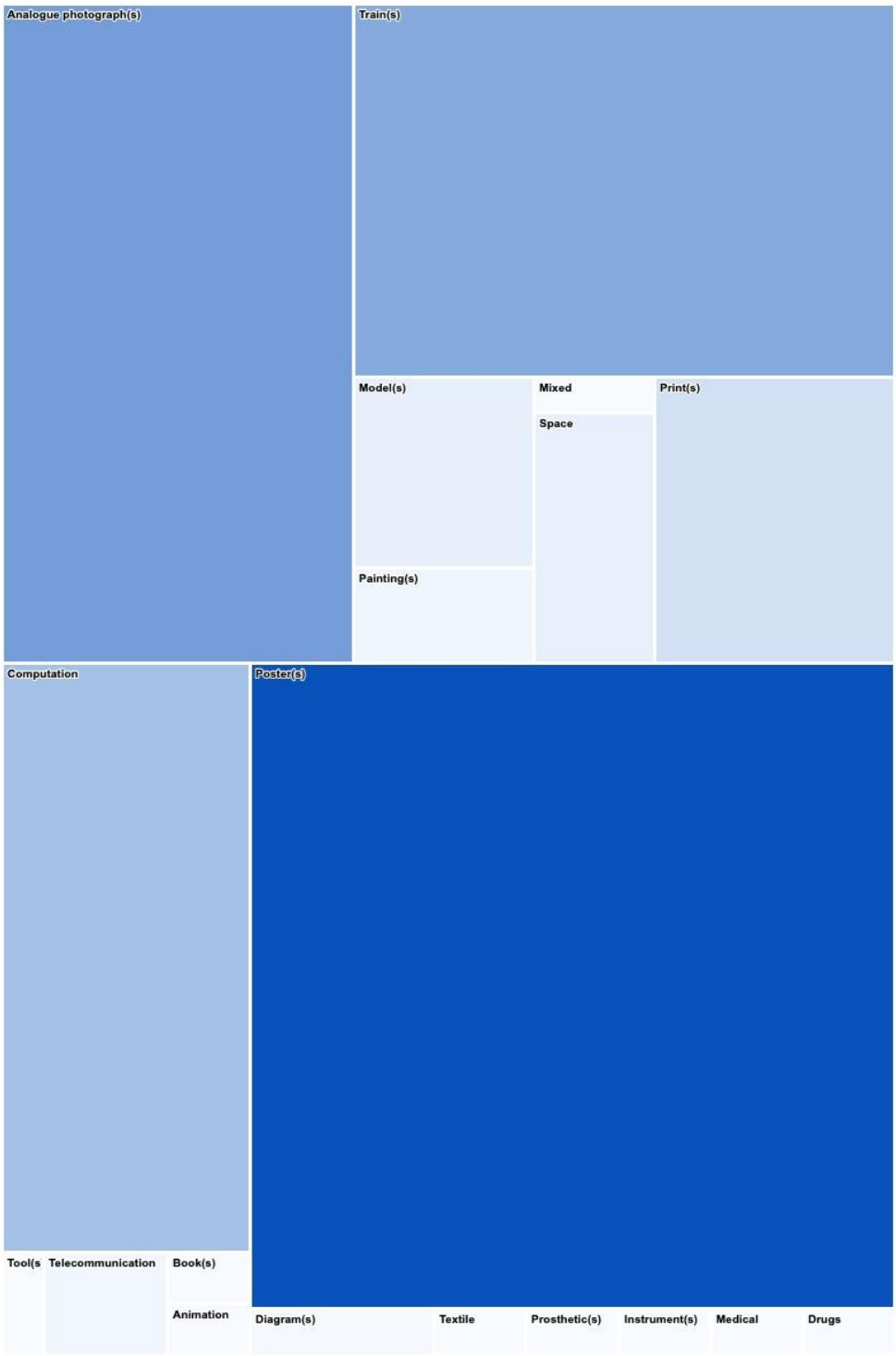


Figure 53 – Tree diagram of SMG collection object types (defined by the researcher) in the N/A Twitter dataset.

What types of SMG collection object are people sharing through Twitter from a digital encounter? The two largest categories of types of SMG collection objects are analogue posters (34.5%) and analogue photography (19.2%). These digital images of the SMG collection, specifically 2D collection objects, have been digitised by the museum and then shared through Twitter. This would suggest that when sharing objects through Twitter, people are more likely to share a digital-to-digital encounter with an object if that object is 2D. Considering the most shared collection category – posters – and looking at Figure 48, Figure 49 and Figure 50 can see the nostalgia and pleasing aesthetic nature of these posters. Are people more likely to share a digital encounter through Twitter if the collection object that is being shared is 'beautiful'? There is still representation in the N/A dataset of popular collection object types from physical-to-digital sharing on Twitter: the tree diagram in Figure 53 shows the third, 'Trains' (16.7%), and fourth, 'computation' (12.1%), categories. However, they are not the most popular here. Is there something about the sharing of images of 2D collection objects as a digital image which suggests that the reproduction technology is better suited to capturing and representing these types of collection objects? Digital imaging works well for reproducing 2D SMG collection objects and therefore they represent the largest collection types shared through Twitter.

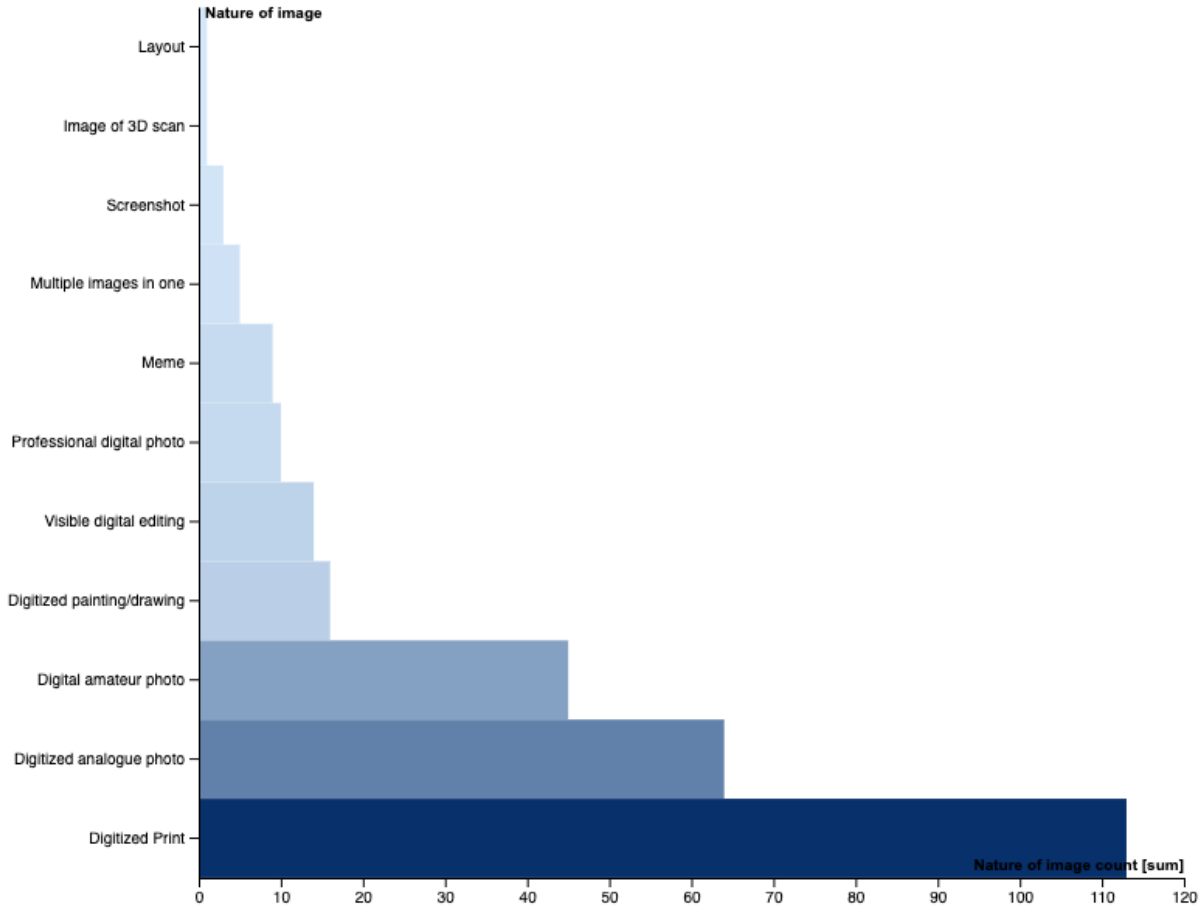


Figure 54 – Bar chart showing 'nature of image' sub categories in the N/A location Twitter dataset.

Digitised 2D SMG collection items are most likely to be shared through Twitter. Three of the four largest subcategories of image in the N/A location data – Figure 54– are digitised. These collection images - 'digitised print', 'digitised analogue photo' and 'digitised painting/drawing' - are digitised by the museum then shared through Twitter. As we can see from the category names, these are collection objects that are 2D. Their prevalence in the N/A location dataset could be, as noted above, because they were conceived as 2D therefore digital images are an effective collection reproduction technology for them. The collection objects in the long tail have been digitised in a slightly different way. For example, with the 'image of 3D scan', a very small sub-category, the collection object has

been digitised as a 3D scan. This is not, however, what has been shared, which is rather a digital image (without the enhanced capabilities of a 3D scan), a representation of another method of digital collection reproduction. 'Screen shot' is another way of identifying a digital encounter, as someone who has encountered the digital image of the collection object has captured it taking a screen shot of what they are seeing on their device and then sharing that. These images of collection objects may not have been taken originally by the museum.

SMG collection objects also feature in meme construction and conversations. Although memes are not well represented in the dataset – there are nine tweets in the N/A tweet dataset tagged in the category of 'Nature of image' as being memes – but they are an interesting/different way in which collection objects are encountered digitally. They form a stark contrast with, for example, digitally encountering objects in collections online. Memes are different from both the subcategory, in 'nature of image', of 'visible digital editing' and the subcategory of 'Personal (creative) response' from 'staging of image' because they are a specific form of communicating by image. Merriam-Webster defines a meme as 'an amusing or interesting item (such as a captioned picture or video) or genre of items that is spread widely online especially through social media.'[518] Memes are images that mean a specific thing - there is an understanding of the joke or specific meaning that that meme represents - and these are then shared and edited. Ryan Milner in *The World Made Meme: Public Conversations and Participatory Media* introduces the idea that a meme is bigger than one person; it happens because of collective input, and it exists in multiple forms and formats made possible by participatory media.[519] The sharer/editor, in using this meme or image takes that meaning. They edit the photo in the form of text or editing in a part of another image or images, and in so doing they build on the original meaning of the meme and bring their own personal experience or point of view to

[518] 'Meme Definition & Meaning', *Merriam-Webster* <https://www.merriam-webster.com/dictionary/meme> [accessed 23 March 2024].
[519] Ryan M. Milner, *The World Made Meme: Public Conversations and Participatory Media* (MIT Press, 2018), pp. 2–3.

it. Perhaps comparable to a joke format, the meme format creates a visual that is immediately understood (by those who know) then built upon with the edits. Memes have been made to be part of an ongoing conversation; copying and referencing enable the creator to contribute to an ongoing joke. 'As objects of digital culture, memes sit awkwardly within established property regimes, obfuscating attempts to establish clear provenance, and rejecting the traditional notions of ownership that form a central pillar of established museum acquisition processes.'[520] Reese notes that due to the collective contributory nature of memes they do not fit neatly into more traditional museum ideas of provenance. Memes are about participation rather than ownership.

A meme is a great example of a networked image. A 'hybrid of culture and technology', [521] as introduced in discussions of the networked image in Chapter one, a meme exists with the expectation of reappropriation. It invites participation through editing or just being part of the joke. The meme itself is an object and a vehicle simultaneously.[522] The multi-modal potential of sharing through Twitter means that the meme image can be edited, or the image can be shared and the meme image recontextualised, shared on through tweet text or a retweet.[523] The meme is a networked image, shared and reshared as part of its ongoing evolution, with social media as its medium.

The affordances of Twitter mean that digitised SMG collection objects have been incorporated into memes, which have then circulated and joined wider conversations. Digital images from the SMG collection have been used and encountered as memes through Twitter. Twitter allows for easy sharing of an

[520] Arran John Rees, 'Collecting Online Memetic Cultures: How Tho', *Museum and Society*, 19.2 (2021), pp. 199–219 (p. 200), doi:10.29311/mas.v19i2.3445.
[521] Dewdney, p. 77.
[522] Limor Shifman, *Memes in Digital Culture* (MIT Press, 2013), p. 38.
[523] Marta Dynel, 'The Pragmatics of Sharing Memes on Twitter', *Journal of Pragmatics*, 220 (2024), pp. 100–115 (sec. 4), doi:10.1016/j.pragma.2023.12.001.

image, and the immediate and conversational thread nature of the user interface means that conversations can be had with images. The image in Figure 55 is from a conversation on Twitter relating to SMG collections. The conversation took place through the medium of images, memes and gifs. The image in Figure 55 was included in a Twitter conversation with @SIM_Manchester. The conversation starts with another meme, an image with text edited into it, which questions why people would appreciate trains. @SIM_Manchester responds with a reaction Gif, emphasising shock at such a sentiment, and another Twitter user responds with Figure 55. The meme format is that of a formally dressed person, wearing a colourful cravat and holding a piece of paper, which for the purposes of the meme can be edited to be blank so that the producer of the meme can add in their own picture or text. The subtitles on the image read: 'If you're not attracted to this then you're wrong.' The person here has edited in Stephenson's Rocket, a 'big ticket' object from the SMG collections[524] that is well known and well shared. The implication is that you are wrong if you do not like trains, and the meme builds on humour to make the collection accessible on multiple levels. Stephenson's Rocket is acting as iconography for the concept of trains in general. Stephenson's Rocket is used as pictorial shorthand for trains in Figure 55 , where it has been edited into an existing meme. Digital images of collections are being drawn upon to signify larger themes/topics, and in this way the collection is being encountered in this new context of memes.

[524] See Chapter 3 for big ticket object explanation.

Figure 55 – Edited meme. Image of a person holding a picture of Stephenson's Rocket on a blank background. Captioned "If you're not attracted to this, you're wrong." The image cited here has been redacted to prevent copyright infringement.

Pinterest

This section will now consider collection recontextualisation through repinning, analysing digital encounters with SMG collection objects shared through Pinterest. The Pinterest dataset has been collected from a number of sources: Science Museum Group Pinterest Business analytics, Pinterest API, Science Museum Group Colleciton API. Pinterest data from a six-month period, from 9th July 2019 to 7th January 2020, was analysed. There are 1,350 rows of pin data from the six-month analytics download period. This has been supplemented with data from the Pinterest API for 8th April 2020 to 20th April 2020. A subsection of the larger SMG Pinterest dataset is the Pinterest board dataset, which aggregated and coded data about the Pinterest boards that SMG collections were pinned to. This dataset is smaller, including 332 rows for board names. Board name analysis was hand-coded in Excel, then analysed. The in-depth discussion of these processes are covered in Chapter 2: Methods.

Pinterest pins

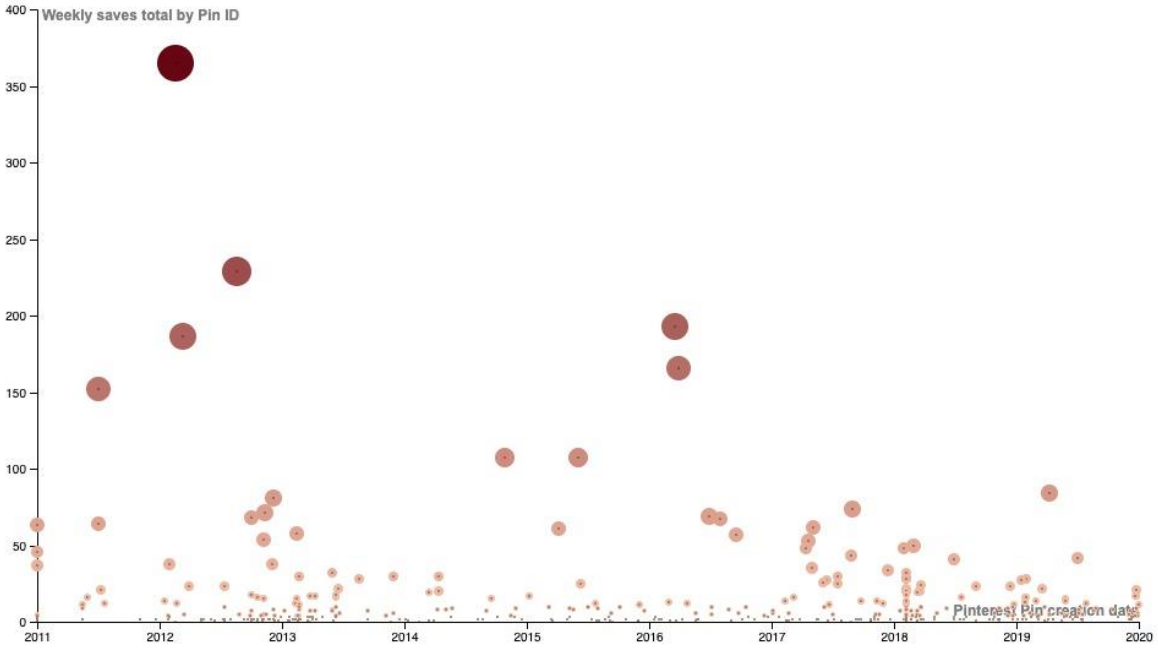


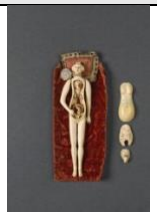
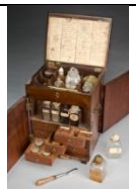
Figure 56 - Bubble chart showing the number of weekly saves by pin creation date. (Unique pin ID numbers were used).

There are pins containing SMG collection objects that have been circulating on Pinterest for almost a decade, but the age that a pin was created does not determine its popularity. The bubble chart (Figure 10), which functions in a similar way to a scatter plot, shows that there is no correlation between when a pin was created and the amount of time it has been shared (by weekly saves). It shows that the pins that have been saved during the period of collection from 9th July 2019 to 7th January 2020 have been in circulation from anywhere between 2011 and 2020. It also shows that these pins are getting saved multiple times. There is some clustering of saved pins created from around the end of 2012 to the beginning of 2013, as well as mid 2017 and around the start of 2018. Although the graph does suggest that a pin containing an SMG collection object does not correlate with age of creation, it does show some outliers. One of the oldest pins in the dataset – see Figure 56 – is the most saved by a substantial amount. The pin was created in early 2012, has been saved 365 times, and depicts a female ivory

anatomical figure from Sir Henry Wellcome's Museum Collection (see Figure 57). Table 1 below shows these other outliers, all of which were created before 2017 and have been saved over 150 times during the period of data collection. Five out of six of these SMG collection items are on long-term loan from the Wellcome Collection.

Figure 57 - Science Museum Group. Female ivory anatomical figure, Europe, undated. A642621. Science Museum Group Collection Online. Accessed 23 March 2024. https://collection.sciencemuseumgroup.org.uk/objects/co77120/female-ivory-anatomical-figure-europe-undated-anatomical-figures. © The Board of Trustees of the Science Museum, under a CC BY-NC-SA 4.0 Licence.

Table 8 - The top six most saved pins from the Pinterest dataset, and the SMG collection objects they represent. All Images below from Science Museum Group Collection © The Board of Trustees of the Science Museum, they are under a CC BY-NC-SA 4.0 Licence.

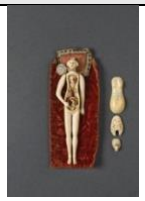
Ranking	Weekly_saves_Pin_ID_analytics	Pinterest_Pin_creation_date	Object title	Object number	Small ref image
1	365	18/02/2012	Female ivory anatomical figure, Europe, undated	A642621	
2	229	18/08/2012	Wooden mask	A193924	
3	193	16/03/2016	Mahogany medicine chest, England, 1801-1900	A23808	
4	186	11/03/2012	Wax anatomical model of a female showing internal organs, Florence, Italy, 1818	1988-249	[The image cited here has been redacted to prevent copyright infringement.]

5	166	29/03/2016	Materia medica chest, Netherlands, 1750-1850	A655802	
6	152	04/07/2011	Saddle bag first aid kit, England, 1900-1918	A656296	

Medical collection items from the Wellcome Collection are well represented in the most shared SMG objects and pins in the Pinterest dataset. There are some slight differences in the ranking of collection objects by pin frequency or by object frequency, but overall the same objects are featured. The process for identifying the top saved objects involved duplicates being removed by object number, then filters were used to find the most saved (1,142 duplicate values found and removed; 208 unique values remained). This was important to do as collection objects can appear in multiple pins.

The collection objects depicted are small and detail oriented. Although it is difficult to truly appreciate the scale of objects in collection reproductive photography, as discussed earlier in the chapter, what is shown, with the exception of Queen Victoria's Saloon, are all small objects that can be photographed either on a neutral background or close up. The images, especially the medical chests and anatomical figures, depict the intricate detail present in these objects. Even with Queen Victoria's Saloon, which is large in scale, the image depicts the lavish and detailed décor of the train carriage. The affordances of both collection photography and Pinterest allow for a close-up look at the SMG collections.

Table 9 - Table showing top 10 SMG objects shared as pins as part of the Pinterest dataset. All Images below from Science Museum Group Collection © The Board of Trustees of the Science Museum, they are under a CC BY-NC-SA 4.0 Licence.

Rank	Date pin featured in created	Image Source	Saves by object number	Object number	Title	Image for ref
1	18/02/2012	BTL_man&redirect	523	A642621	Female ivory anatomical figure, Europe, undated	
2	30/09/2012	BTL_man&redirect	276	1988-249	Wax anatomical model of a female showing internal organs, Florence, Italy, 1818	[The image cited here has been redacted to prevent copyright infringement.]
3	24/08/2012	BTL_man&redirect	268	A23808	Mahogany medicine chest, England, 1801-1900	
4	18/08/2012	Manual	262	A193924	Wooden mask	

5	29/03/2016	Manual	187	A655802	Materia medica chest, Netherlands, 1750-1850	
6	04/07/2011	BTL_man&redirect	175	A656296	Saddle bag first aid kit, England, 1900-1918	
7	02/06/2015	BTL_man&redirect	135	1988-256	Wax anatomical model of a human head	[Image not shown on collections online.]
8	09/04/2019	Collection Online	107	1983-7002	Queen Victoria's Saloon	[Cannot find record]
9	12/07/2012	BTL_man&redirect	93	A640364	Bottle of ergot extract, London, England, 1891-1950	
10	11/11/2012	Manual	88	1990-230	Orrery planetary model by the Laing Planetarium	[Image not shown on collections online.]

					Company, 1910-1920	

The most shared pin and object is *Female ivory anatomical figure*, a small female figure carved in ivory and depicted as pregnant, from the Anatomy & Pathology collection category. The image of the object that has been widely shared through Pinterest does not show the box the model comes in. The figure is shown reclined on a velvet material complete with cushion for the head, and red cord depicted in some of the internal organs and the umbilical cord. It, like seven of the top ten saved objects, is medical in nature, although there are other types of object featured. We see that some of the objects that have been widely shared no longer have accessible images on collections online. This shows the changeability of digital collection access over time.

Most saved objects from the SMG collection originated from the Brought to Life mini collections site. Brought to Life was a collection website of SMG

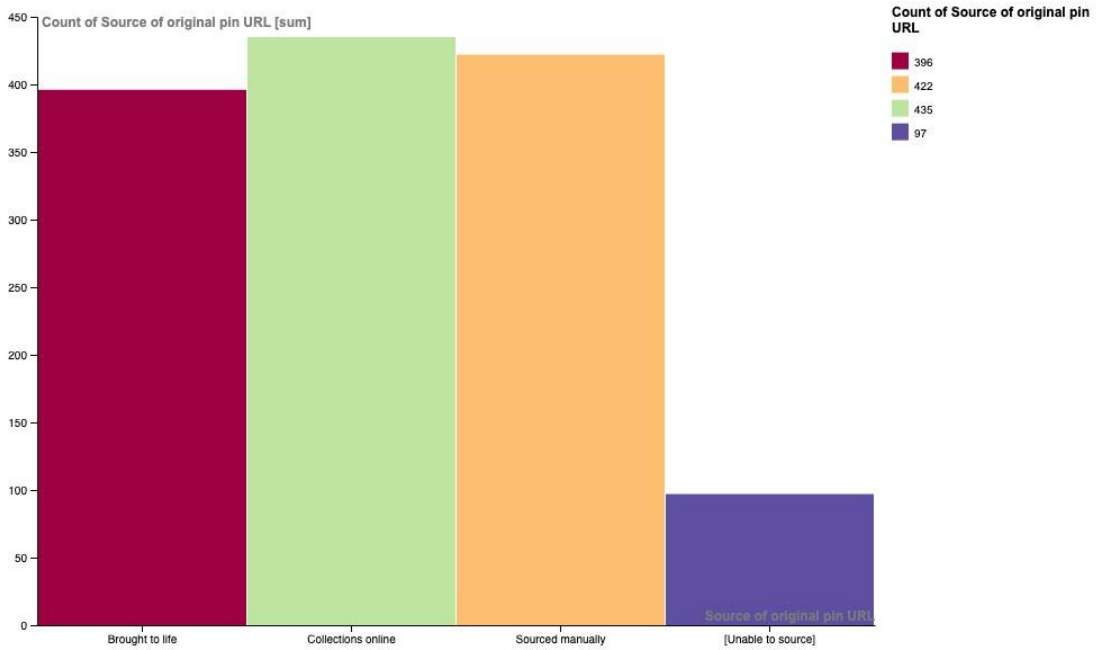


Figure 58- Source of SMG collection URLs, as linked in the pins.

designed and built with the Wellcome Collection. The objects displayed on Brought to Life were/are part of the long-term loan agreement between the Science Museum Group and the Wellcome Collection. The website was decommissioned during the course of this research, although the pages can still be found archived in the National Archives' UK Government Web Archive. Aspects of how the collection objects from Brought to Life have been saved and shared online will be discussed in the case study chapter, but it is interesting to note here how many images from that early collections online platform are showing up in the most saved pins, even when the website was at the end of its life or getting decommissioned. Figure 58 shows that Brought to Life was the third most popular source of SMG collection URLs that pins were pinned from. However, we see in the top ten objects there are six that are sourced from a Brought to Life page.

The collections shared on Pinterest were sourced to SMG records in three main ways: they were either linked back to Brought to Life or SMG collections online, or they were manually linked to SMG collection resources. Apart from the pins that could no longer be sourced, there was almost an even split between the three sources of the pin URLs. The bar chart in Figure 58 depicts the SMG web pages from which the images of the collection objects were sourced. With the exception of Brought to Life – where the older 'http' protocol was used, requiring some intervention from the researcher: the addition of an 's' after http to make the API work is explained in Chapter 2 – these were the easiest to source. Both collections online and Brought to Life are browser-based SMG collection pages, in different iterations. The data suggests that most images of the collection that are shared through Pinterest are sourced from SMG collections pages that have been accessible online.

Not all images of the SMG collection that are shared on Pinterest are from one of their collections online sites. The pins that are sourced manually can be

Figure 59 - Science Museum Group. George III's double-barrelled air pump. 1927-1624/1. Science Museum Group Collection Online. Accessed 23 March 2024. https://collection.sciencemuseumgroup.org.uk/objects/co2230/george-iiis-double-barrelled-air-pump-air-pumps-double-barrelled-air-pumps. © The Board of Trustees of the Science Museum, under a CC BY-NC-SA 4.0 Licence.

sourced from collections online, but they were also found on other areas of the websites before being connected with their collections online image. This reflects what was noted in the interviews: SMG staff do sometimes source collection photography to be used on SMG web pages and platforms from collections online. For example, the Figure 59 shows 'George III's double-barrelled air pump'. This image was sourced and shared from the Science Museum Group Journal.[525] Still a digital image of the pump on collections online, it sits alongside a mix of new and old images of the pump on various coloured backgrounds.[526] So, this is a collection object which does have a presence on collections online but was sourced from the SMG's journal.

[525] Florence Grant, 'Reading, Writing, Drawing and Making in the 18th-Century Instrument Trade', *Science Museum Group Journal*, 2014 <https://journal.sciencemuseum.ac.uk/article/the-18th-century-instrument-trade/> [accessed 23 March 2024].

[526] 'George III's Double-Barrelled Air Pump | Science Museum Group Collection' <https://collection.sciencemuseumgroup.org.uk/objects/co2230/george-iiis-double-barrelled-air-pump-air-pumps-double-barrelled-air-pumps> [accessed 23 March 2024].

There are other examples of images being sourced from different areas of the SMG websites, for example their blogs. An image of the launch of Apollo 11, for which the source was manually tagged in the dataset, was a Pinterest pin created 16 July 2019 when it was pinned from the Science Museum blog homepage.[527] The image does not appear on the Science Museum Collections Online page. In Figure 60 a pin featuring 'Young couple listening to music and looking at records in a living room', from the Daily Herald archive,[528] was also pinned from a blog post on 'What Science Says about the Mood of Music' on 16 July 2018. [529] The image is featured in the blog, but it is not referenced that the image is from the collection. These are the exceptions. Images from the blog post generally seem to be non-collection related. These examples suggest that all the online platforms of SMG are potential sites for encounters with images of collection objects. The affordances of Pinterest mean that people can pin any digital image that appeals to them, but this thesis has limited its scope to collection objects.

[527] 'Science Museum Blog - News and Insights from the Science Museum in London.', *Science Museum Blog* <https://blog.sciencemuseum.org.uk/> [accessed 20 March 2023].
[528] 'Young Couple Listening to Music and Looking at Records in a Living Room | Science Museum Group Collection' <https://collection.sciencemuseumgroup.org.uk/objects/co8223435/young-couple-listening-to-music-and-looking-at-records-in-a-living-room-gelatin-silver-print-photograph> [accessed 23 March 2024].
[529] Philip Ball, 'What Science Says about the Mood of Music', *Science Museum Blog*, 2018 <https://blog.sciencemuseum.org.uk/what-science-says-about-the-mood-of-music/> [accessed 23 March 2024].

Figure 60 - Screenshot of young couple listening to music and looking at records in a living room. 1983-5236/12516. Science Museum Group Collection Online. Accessed 23 March 2024. https://collection.sciencemuseumgroup.org.uk/objects/co8223435/young-couple-listening-to-music-and-looking-at-records-in-a-living-room-gelatin-silver-print-photograph. Featured in SM Blog: https://blog.sciencemuseum.org.uk/what-science-says-about-the-mood-of-music/. The image cited here has been redacted to prevent copyright infringement.

Let us turn next to identifying which parts of the SMG collection have been shared through Pinterest. The Science Museum Group has catalogued its collection and created categories that describe the collection objects. These catalogue description data of the collection objects were collected from the SMG's collection API, which powers the collections online, and which draws from Mimsy, which is the collections management system the SMG uses to describe and track the collection. The graphs in Figure 61 and Figure 62 use the fields in the collection of 'category' and 'Type' of object respectively, to understand what parts of the collection and what types of objects are most often getting shared through Pinterest. It should be noted that these collection identifiers relate to the reason why those objects have been collected by SMG; it may not be what would be expected to be associated with that collection object. For example, although not included in that dataset, a Barbie doll is categorised as 'Materials Science

Gallery' because this is the reason the SMG collected it,[530] with its 'type' defined as 'toy - recreational artefact', but it may be better understood to someone outside of the Group that way (not all Barbies in the collection are catalogued in the same way).[531] That may be a limitation of using these identifiers as the sole means of collection description.

Figure 61 – Tree diagram of category of SMG collection objects represented by pins in Pinterest dataset. Collection category defined by SMG.

The categories of SMG collection objects most often shared through Pinterest are those that are medical and anatomy related. The graph in Figure 61 shows SMG collection categories by weekly pin saves. The most shared category is Anatomy and Pathology (1,065), followed by Materia Medica and Pharmacology

[530] 'Barbie Doll, Black Skinned, Green Bikini | Science Museum Group Collection' <https://collection.sciencemuseumgroup.org.uk/objects/co525637/barbie-doll-black-skinned-green-bikini-character-doll-toy-recreational-artefact> [accessed 23 March 2024].
[531] 'Search Our Collection | "Barbie" | Science Museum Group Collection' <https://collection.sciencemuseumgroup.org.uk/search?q=barbie> [accessed 23 March 2024].

(632), and Asian Medicine (366). It is only at the fourth most shared collection Type - Railway Posters, Notices and Hand bills (355) - that a non-medical related collection category appears. This is perhaps to be expected when considered alongside the high numbers of trains in the Twitter dataset (see Chapter 3 – collection object types). The fifth most shared category is Therapeutics, another medical related category, with 340. From this it could be suggested that, although broken down into different categories here, images of the SMG's medical collection are the most likely to get shared through Pinterest. Even when looking at some of the smaller categories present we find medicine represented in medical categories such as, 'surgery', 'medical glass wear' and 'obstetrics and gynaecology.' In Figure 58, around a third of the images are sourced from the medically themed Brought to Life, but Figure 61 also shows that more than half of the categories shared are medically themed. Therefore, from this data is clear that medical objects are being shared from more spaces on the SMG websites than just Brought to Life. The dominating presence of medical and anatomy as a

shared SMG collection category cannot be explained by Brought to Life alone, but the contribution of this website should not be understated.

The types of objects, as defined by the SMG, give further insight into the spectrum of collection item being shared through Pinterest. Analysing the type of

Figure 62 - Tree diagram of Type of SMG collection objects represented by pins in Pinterest dataset. Collection type defined by SMG.

object in SMG collection descriptions gives a more in-depth view than the top-level collection category. Through these types it is possible to see the presence of some of the objects outlined in Table 8 and Table 9. For example, medicine chest has its own dominating category, which is because of the presence of the two medical chests we see in the top saved pins and collection objects. The same could be said for the top nine categories. Type is more descriptive than collection category and for this reason it is in the smaller categories that we perhaps gain an insight into what of the SMG collection objects are being shared.

Pinterest Boards

SMG collections are shared and recontextualised as they are pinned to Pinterest boards. Pins on Pinterest are organised into boards by users, and the qualification for being part of the Pinterest dataset was that an SMG collection object had to be saved on to a Pinterest board. This might happen through the act of creating a pin as a save, or seeing an SMG collection object as a pin already on Pinterest and then the user saving – or re-pinning – it to their own board. All these encounters with representations of the SMG collection are happening digitally, through an SMG platform where the collection is held, including collections online and Brought to Life, an SMG blog, the SMG homepages and so on. Alternatively, the pin might be encountered on Pinterest on another user's board or as a suggested pin from Pinterest. This form of digital-to-digital sharing is explored in this chapter, to better understand *how* the collections are recontextualised through sharing. Noting these different types of digital encounters aids in understanding the sharing to Pinterest boards as both a recontextualisation and the site of a potential future encounter with the collection. This is separate from and in addition to the creation of a pin featuring an SMG collection object already existing on Pinterest. This might be suggested to other Pinterest users, if the platform has determined that the pin relates to or depicts something the user may be interested in.

The Pinterest board dataset was hand-coded, and this content analysis showed the boards fell into three main themes. There are 321 unique boards in the Pinterest dataset (boards that had been deleted or made private were removed so the total fell from the original 332). The total number of pins in the dataset is 1,349, which suggests that pins are saved multiple times to the same boards. Content analysis tags were used to understand board themes rather than the more museum-like category of the boards e.g. 'netsuke'. These themes are, therefore, different from the ones that Pinterest would automatically generate.

Content analysis tags should be valid and replicable.[532] When using the content analysis method adopted for this thesis, categories or codes must be: 'Exhaustive' – every image can be covered, 'Exclusive' – with no overlap, and 'Enlightening' – otherwise explained as 'analytically interesting.'[533] Rejected content tags included, for example 'Mood board', which was abandoned because of potential overlap with 'Subject area theme'. The final list of content categories for board themes used was:

- subject area theme,
- grouped by type of object,
- theme not immediately obvious to third party (TNIOTTP).

Content analysis codes were designed to be without value judgement, but descriptive of theme, and to be non-object specific. The process for this was done through a close reading of each board by the researcher, looking at names and examining the board. Pinterest boards were only looked at and visited while the researcher was not signed in, in a private or incognito window so that results were not affected by cookies, user personalisation features or other factors.

[532] Rose, *Visual Methodologies*, p. 46.
[533] Rose, *Visual Methodologies*, p. 92.

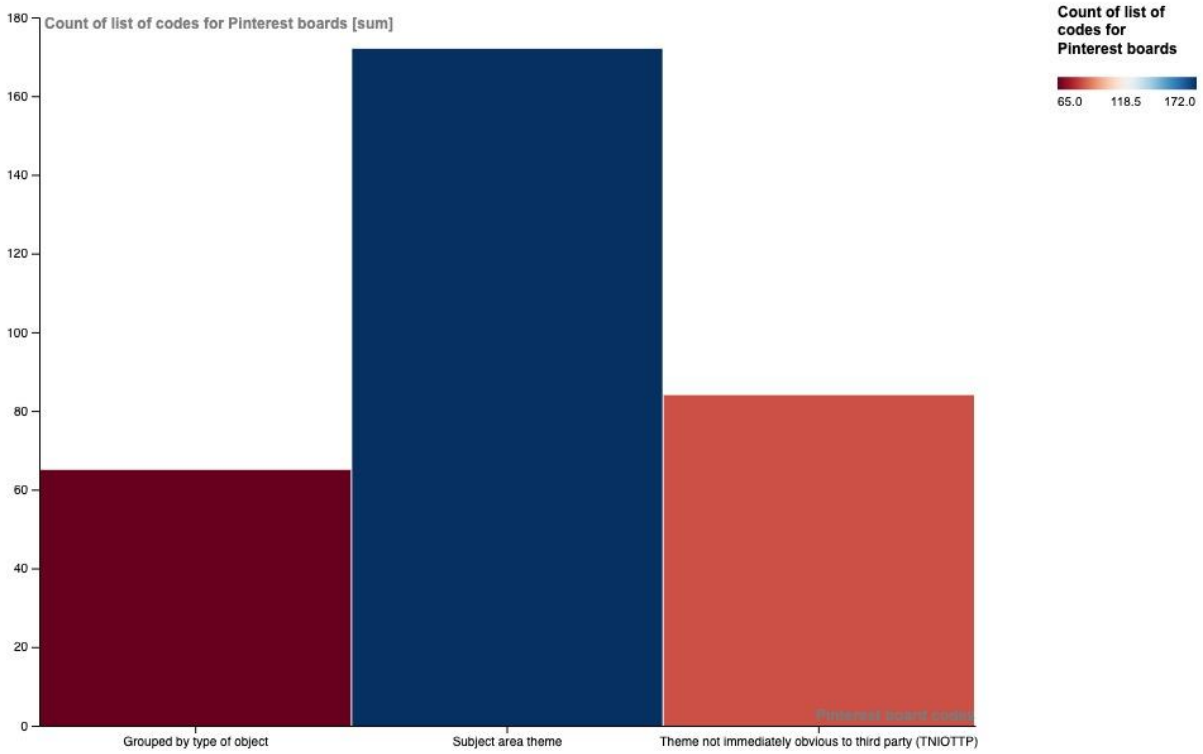


Figure 63 – Bar chart showing visual codes (as defined by researcher) of Pinterest boards.

These far-reaching board categories give an idea of digital curation methods for content (see Figure 63). The prevalence of subject area themed Pinterest boards is perhaps to be expected considering the affordances of the platform. Pinterest boards allow you to collect and arrange images on boards, and having these organised by a subject theme is perhaps the most obvious option. The image content – images of museum collections – also perhaps lends itself to the category of being grouped by type of object, for example there are several boards dedicated to netsukes (see Figure 68), but also cameras, bags or jewellery. However, this is only the third largest group of Pinterest codes - the second is theme not immediately obvious to third party (TNIOTTP). The prevalence of TNIOTTP suggests that these boards were not designed or imagined to be consumed by anyone other than the creator, although published publicly. These boards suggest that an affordance of Pinterest is the personal organisation and consumption of content. It is not a priority that the theme of the board makes sense to anyone else.

Platform affordances have shaped user behaviour, but within this there is still personalised platform use. There are objects pinned to aesthetically led boards like 'Steampunk & retro' where SMG collection images feature and are recontextualised within the steampunk aesthetic. Steampunk is a subculture,[534] 'a subgenre of science fiction that incorporates retro-futuristic technologies and aesthetic designs inspired by the 19th century industrial machinery which was powered by steam.'[535] Then there are aesthetic curations that are perhaps less obvious for SMG, but typical for Pinterest. We find, for example, a *Simple theodolite, Italian, 1676,*[536] a 17th- and 18th-century instrument for comparing angels, recontextualised within an 'Ideas for the House' Pinterest board for home design and planning, alongside other home design-based pins as well as non-image based links to building and contractor information. Here we see curation

Figure 64 – Cropped screenshot taken 2024-02-24 of Pinterest board featuring the SMG collection, that is focused around fashion history and curated into different board sections. The image cited here has been redacted to prevent copyright infringement.

[534] Rebecca Onion, 'Reclaiming the Machine: An Introductory Look at Steampunk in Everyday Practice', *Neo-Victorian Studies*, 1.1 (2008), pp. 138–63.
[535] 'What Is Steampunk? - Find All You Need to Know about Steampunk' <https://allaboutsteampunk.com/> [accessed 23 March 2024].
[536] 'Simple Theodolite, Italian, 1676 | Science Museum Group Collection' <https://collection.sciencemuseumgroup.org.uk/objects/co52747/simple-theodolite-italian-1676-simple-theodolite-magnetic-compass> [accessed 23 March 2024].

by users of the images of the SMG collections in ways that are personal to the Pinterest user and their interests.

Themed historical curation can be an act of linking of collections, and as such a crowdsourced site of knowledge generation. There are boards that are arranged in ways that are similar to established ways of organising heritage materials. For example, a fashion history Pinterest board, previously called "1600s", divides fashion history image examples into different decades and centuries. SMG collection objects are also found in Pinterest Boards of recognisably museum collection photography, for example a page on antiquities that has the SMG collection recontextualised alongside pins from the Metropolitan Museum of Art, the British Museum, the Ashmolean and the V&A. This page also has commercial antiques specialists like Sotherby's alongside pins from image hosting social platforms like Tumblr and Flickr. This shows how Pinterest can be used as not only a curation tool, but a way of linking objects across collections. Pinterest has been used here as a site to organise heritage content. A board collection by the charity Marie Curie UK used Pinterest as a digital space to pull in images from different sources that show and introduce the history of the organisation.[537] This is highly suggestive of Pinterest's potential as a research tool for finding further sources.

Pinterest boards can be used as personal research and collection areas. In the Pinterest board dataset, there is an example of a railway posters board that has been organised by poster artist. It is an aspect of the collection of railway posters which is important and notable, but not necessarily the most visible. This board utilises a lot of SMG content, as well as suggesting that there may be other images circulating through Pinterest, as it has links to old domains of the National Railway Museum (NRM) and NMSI (National Museum of Science and Industry, now SMG).[538] This Pinterest user has curated SMG collections alongside other

[537] 'Marie Curie's History', *Pinterest* <https://www.pinterest.co.uk/mariecurieuk/marie-curies-history/> [accessed 20 March 2023].
[538] Old link "collectionsonline.nmsi.ac.uk"

sources like Flickr and Getty Images to show railway posters organised by artists. The board is a curation and collection point for multiple collections, and a striking example of crowdsourcing effort and knowledge creation by Pinterest users around the collections.

SMG's collections are recontextualised in unanticipated ways through the mechanisms of Pinterest. This might be through things like generated content tags or through in-built features of the platform. For example, the Pinterest user interface allows a user to make a board based on a pin, then suggests names for the board based on the contents of that pin. We see in the image in Figure 65 a pin shared as part of the Pinterest dataset, that the suggested board names automatically generated for *Hypodermic syringe for cocaine*,[539] are tags like "Medical History", "Victorian" and "Science Museum London", which are relevant to the collection object. This functionality has been noted in work that discusses the potential for applying AI-generated content tagging to automate work for already stretched GLAM professionals.[540]

[539] 'Hypodermic Syringe for Cocaine | Science Museum Group Collection' <https://collection.sciencemuseumgroup.org.uk/objects/co138805/hypodermic-syringe-for-cocaine-hypodermic-syringes-cocaine> [accessed 23 March 2024].
[540] Lise Jaillant and Arran Rees, 'Applying AI to Digital Archives: Trust, Collaboration and Shared Professional Ethics', *Digital Scholarship in the Humanities*, 38.2 (2023), pp. 571–85, doi:10.1093/llc/fqac073.

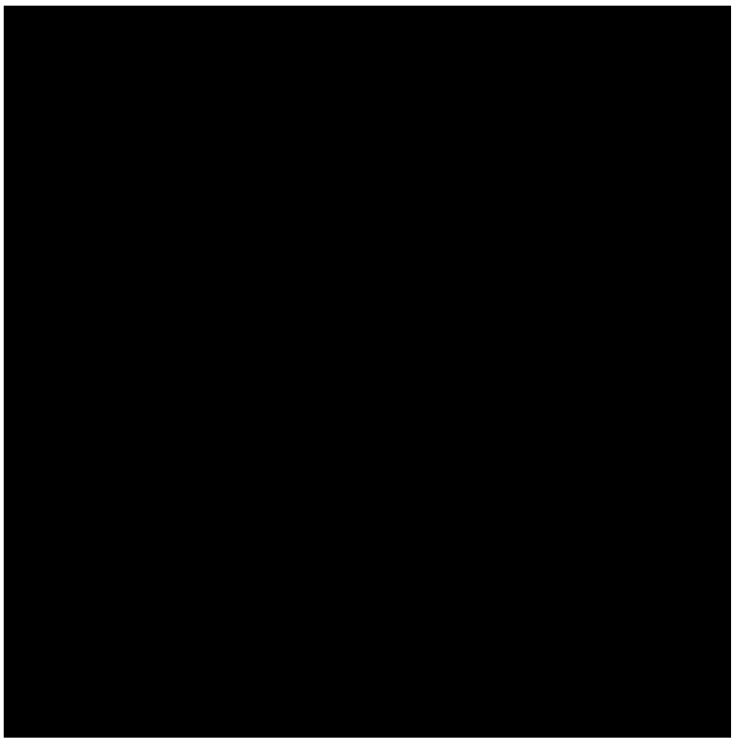


Figure 65 - SMG object in Pinterest board set up on researcher's thesis specific Pinterest account, showing suggested board names, screenshot taken 17 December 2020. The image cited here has been redacted to prevent copyright infringement.

However, as Pinterest is a commercial platform, the museum collection objects are recontextualised within this structure. The different ways that this happens through data are explored further in Chapter 5, but, for example, should someone wish to own something aesthetically similar to a *Pair of Queen Victoria's white satin slippers, England, 1840-1848*,[541] the Pinterest platform can facilitate that, as shown below in Figure 66. The slipper here is recontextualised into a commercial space as a pictorial reference point. Here we see the algorithmic mechanisms of the Pinterest platform, prompting or aiding in potential recontextualisation of the SMG collection.

[541] 'Pair of Queen Victoria's White Satin Slippers, England, 1840-1848 | Science Museum Group Collection' <https://collection.sciencemuseumgroup.org.uk/objects/co155297/pair-of-queen-victorias-white-satin-slippers-england-1840-1848-slipper> [accessed 23 March 2024].

Figure 66 - Pinterest platform UI for finding products based on pins, in this case for SMG collection object 'Pair of Queen Victoria's white satin slippers', A135559, screenshot taken 22 December 2020. The image cited here has been redacted to prevent copyright infringement.

The board content tags automatically generated by Pinterest were also analysed. These tags were manually scraped from the Pinterest boards by the researcher, as part of a separate content analysis of the boards. This board content analysis has not been directly used in this chapter, however Appendix 4 - Alluvial graph showing content type of Pinterest boards has an alluvial graph of this dataset of hand-tagged analysis of unique boards to which SMG object images were pinned. That analysis allowed for close reading of the Pinterest boards, and therefore was valuable for understanding the content, themes and structures of the boards.

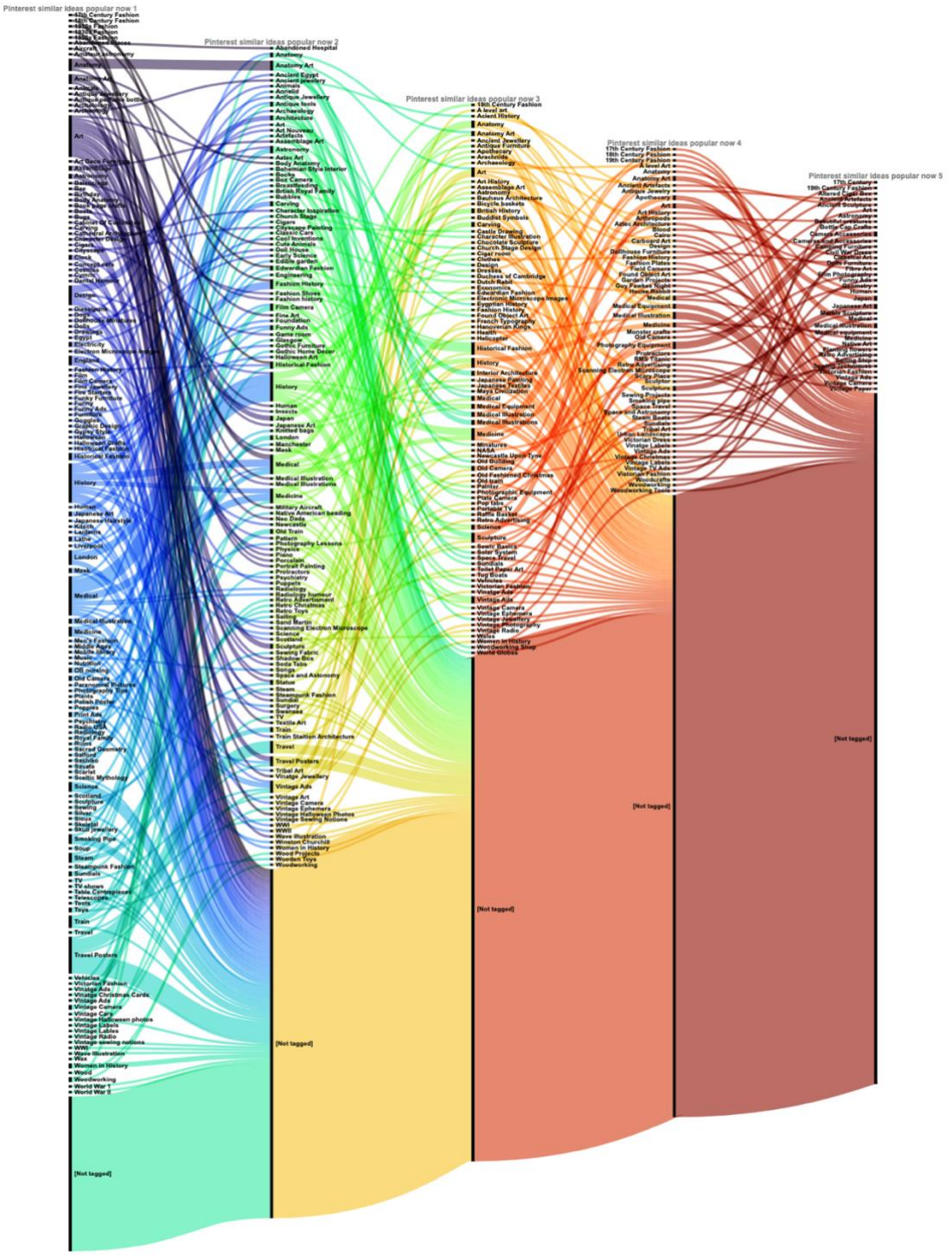


Figure 67 - Alluvial showing "similar idea popular now" suggested images as generated by Pinterest. This represents all the boards in the master dataset.

Pinterest automated labelling of board content is largely consistent with the collection themes of shared SMG items, but also indicates recontextualisation specific to social norms on Pinterest. The graph in Figure 67 shows automatic search terms for looking at/finding more Pinterest content related to the board being looked at, which were termed 'similar ideas popular now'. These appear in the top left section of the screen when a user visits a board, and up to five possible choices were automatically generated, as shown in Figure 68 which depicts a board on which SMG collection object(s) feature. The alluvial graph in Figure 67 shows the breadth of automated ways of describing boards on which SMG objects have been pinned and recontextualised. It is possible to see that the larger categories in 'similar ideas popular now', such as 'Art', 'Design', 'History', 'Medical' and 'Travel Posters', maps similarly on to those in Figure 62 – SMG's collection catalogue object types. However, emphasis needs to be given to the breadth of the different suggested image tags present, beyond those that are similar to the ways SMG collections have already been presented in this chapter. There are 'similar ideas popular now' image board tags that seem specific to a Pinterest context, for example 'Steampunk fashion', 'A-level art', 'Garden Projects', 'Vintage Christmas' and 'Gothic Home Décor'. These are demonstrations of Pinterest specific tags, generated as the SMG collection has been recontextualised on Pinterest, rather than Pinterest names reflecting how the SMG collection has already been described. These automated descriptions of further possible image content from visiting boards it has been pinned to show the SMG collection described and recontextualised by Pinterest.

Figure 68 - Pinterest Board 'Netsuke' that features a SMG collection object, page emphasis on "similar ideas popular now", Screenshot taken 8 June 2022, it has been edited to remove personal identifiers. The image cited here has been redacted to prevent copyright infringement.

Conclusion

SMG's conceptualisation of and values relating to object photography have been spread through social media with digital-to-digital sharing. There are cultural assumptions at work in staged and professional collection object images, even though to date 'The actual practices, skills and cultural assumptions, and the challenges offered by photographs in the everyday practices of museums, have received much less attention.'[542] In order to understand the digital encounter with collection objects, we first have to understand collection photography as a product of museum practices and as something that embodies the organisational practices and values of the Group. The digitisation of large parts of the SMG collection as part of the 'One Collection' project suggests that SMG values the practice of digitisation, and more images of the collection has resulted in increased sharing. It was found that SMG ideally wanted its collections to be

[542] Edwards and Ravilious, 'Museum Cultures of Photography: An Introduction', p. 6.

represented by professional image photography. Moreover, the hierarchical structures of the different digital image repositories within SMG demonstrate differences in collection photography internal to the museum. Collections photography has a specific aesthetic, which is not neutral and conveys what the museum values. The photographer may not have been thinking of the audience for the images when creating collections photography, but rather first and foremost trying to get a good representation of the object or item. Collections photography operates within an ecosystem of photography in the museum; it exists in relation to the collection but it is not *of* the collection. Images pass through many members of staff and processes in their production and dissemination. All these enact and re-enact the museum's value systems. These digital collection images are therefore acted upon, and themselves are actors in the Group's ecosystem of images, and they embody the values of the museum. Is the sharing of these images on platforms not owned by the SMG also spreading these values through images, or is something else happening?

Encounters with already digital images of SMG collections on Twitter are informed by the platform's social norms and affordances, as well as the nature of the collections themselves. SMG collection objects encountered through Twitter are likely to be existing images, for example digitisation of 2D collection objects like prints, analogue photography and paintings. Perhaps this is because they were originally a 2D medium, and therefore transfer well into the medium of digital images. However, digital sharing can enable recontextualisation within digital images through editing. SMG collections have become part of participatory conversations online in the form of memes. Digital-to-digital sharing of images is as much about the links and metadata that are shared with the digital object as it is about the image itself. In this way, we can view SMG's collections here as networked images. This varies depending on the affordances and mechanisms of the different platforms researched in this chapter: Pinterest and Twitter.

Medical and anatomical SMG collections are more likely to be shared through Pinterest. A lot of these collection objects were sourced from the now decommissioned Brought to Life mini collections website. This still visible and encountered Brought to Life content shows the legacy of previously digitised and published collections content on third-party platforms. Pin age does not determine popularity of an image, however some collection images have been circulating through Pinterest for almost a decade. This is the case, for example, with the Sioux amulet still circulating on Pinterest, in conflict with the now established SMG image policies on sharing content which mean that an image of it is no longer hosted on SMG collections online website although descriptive metadata is there. Relatively smaller and more detailed objects, for example anatomical figures and medicine chests, are the ones that are predominantly shared digitally through Pinterest. This is because of a juncture between museum collection photography being of an object and item reproduction technology that can highlight this, and Pinterest being a space in which to showcase and highlight detailed images.

Curation of SMG collections is happening on Pinterest through the act of sharing and saving digital collection images. Images – collection object images only in this case – that became pins were sourced from all parts of the SMG websites. SMG collections are being recontextualised within the social norms of that platform, for example historical scientific instruments being recontextualised on home ideas Pinterest boards. The content coding of Pinterest boards TNIOTTP demonstrates the affordances of the platform, and that people are using it as an organisation and linking space for images and concepts that are only obvious and useful to them. However, Pinterest can be used as a more recognisable curated collections space. It can even become an ad hoc site to digitally join multiple museum collections on a wider scale but also in more intentional way through Pinterest boards.

Chapter 5 - Automating context: how digital infrastructures facilitate the sharing of museum interpretation through shared digital images

Introduction

This chapter will explore the different ways in which museum interpretation is transferred through digital images of museum collection objects that are shared on social media. It looks at the different methods and mechanisms involved in a potential transfer of context on to social media, specifically the two platforms on which this thesis focuses: Twitter and Pinterest. It will consider *how* collection object museum interpretation is being shared; whether museum interpretation is being shared differently on different platforms; and how the affordances of the platforms are informing/shaping how museum interpretation is shared. A key area of exploration will be how museum interpretation is expressed by the digital object being shared. This born digital object is separate from but has a relation to the physical collection object being shared. The characteristics of the digital object that has been shared through social media will be introduced, inclusive of the digital image, to understand how the collection object context could be shared with interpretation. The form of the digital object on both platforms will be defined, and the image as part of the digital object will also be considered. Finally, the ways in which collection object interpretation can form part of the digital object will be introduced. By examining and defining the affordances of the different platforms, their impact on the sharing of museum interpretation will be explored.

The chapter starts with an analysis of existing discussion about the sharing of museum interpretation through digital objects using metadata, and positions this in relation to the SMG collections. It then explores how museum

interpretation has both been shared through social media and documented in images. The chapter provides an in-depth grounding for two important theoretical frameworks, object biography and actor network theory, which were briefly introduced in *Chapter 1* - Introduction They are employed in this chapter as conceptual tools. Object biography articulates what is potentially being shared (and by whom) when we talk about museum object interpretation, and actor network theory serves as a lens through which to make sure that the impact and agency of all actors involved in the sharing process, both human and non-human, are noted.

Through its digital governance policies, the SMG has sought to control the context of the images that appear on its own platforms. How the SMG has controlled its own collection images on its own platforms has the potential to affect what can then get shared through social media platforms. This control, however, has its limits. For example, there are previously shared images, which must therefore have appeared online at some point, that persist on other platforms even though they have since been removed from SMG platforms. Pinterest has been used in this thesis to evidence this practice, and it has also been explored through interviews with staff. The policy documentation on images recently created by the SMG will also be discussed to understand how the SMG perceives its images in relation to museum interpretation.

This chapter seeks to understand the digital objects, in some part, as mechanisms for 'onward journeys'. Primary interviews with SMG staff have been employed to investigate their understanding of the construction of the digital object. How does this intersect with what the SMG intended? If museum interpretation is pulling through into the digital object on other platforms, what decisions on SMG's part led to that happening? If URLs are being included, what is their relationship to object interpretation? What are the differences between Pinterest and Twitter in this respect? Are there onward journeys if these are links

that have been posted by people other than the museum? Are there only onward links because they have been posted by staff members on their personal Twitter accounts (Twitter); or is it because of the affordances of the platform (Pinterest)?

Existing discussion

Collections can be conceptualised as data. Data is information, and collections are made up of many layers and types of information. Existing research builds on understanding collections as data, but notably, collections that have been digitised and are accessible online. Framing collections as data enables them to be considered as mass sharing, and they can then be analysed further through the lens of digital processes and infrastructures.

The reframing of museum collections as data is relatively recent. In 2018, Padilla made the point that, 'Collections as data raises the question of what it might mean to treat digitised and born digital collections as data rather than simple surrogates of physical objects or static representations of the digital experience.'[543] Reframing here seems to be a claim for autonomy, for a status that is more than simply surrogate information relating to the material collection objects. Therefore, when thinking about the recontextualisation of collection objects through digital images, we can also understand this as recontextualisation into data. The processing and treatment of collection objects, through the process of digitisation, creates collections data.

Design choices are made when systems are created. The digital infrastructure that makes collections data accessible online is the result of a

[543] Thomas G. Padilla, 'Collections as Data: Implications for Enclosure | Padilla | College & Research Libraries News', 2018, p. 296, doi:https://doi.org/10.5860/crln.79.6.296.

culmination of many people's efforts and a process of numerous decisions. There have been multiple 'design choices' made when building collection APIs and online collection platforms. In discussing cultural heritage institutions (CHIs) providing access through APIs, Jolan Wyatts, in surmising how different CHIs have come to develop their APIs or other forms of collections access, writes: 'CHIs make design choices in the development of their digital services.'[544] What do these design choices do? What do they mean for the sharing of images of digital objects? Why were those decisions made? The work of putting collections online is one of decision making.

SMG online collections data infrastructure was designed to process data automatically from internal systems to the public-facing website, once the pipeline was set up and running. Digital infrastructure is considered as the physical hardware, software, and other connective technologies.[545] Where is the human intervention at various stages, and who has agency over what information can be passed on, shared and accessed, at various parts in the pipeline? In *On Complexity of GLAMs Digital Ecosystem: APIs as Change Makers for Opening up Knowledge*, Tzouganatou describes infrastructures as relational and ecological processes: 'As infrastructures are both "relational and ecological" [24, p.377], the sociotechnical elements necessary for their functionality interact in an iterative process [13].'[546] Digital infrastructure here is viewed as inclusive of the people and staff who input into it, or whose work and labour has constructed it or the data that flows through it. One of Padilla's critical provocations is that

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[544] Jolan Wuyts, *Cultivating APIs in the Cultural Heritage Sector*, 2018, p. 22 <http://jolanwuyts.eu/files/Cultivating_APIs_in_the_cultural_heritage_sector_Jolan_Wuyts_2018.pdf>.

[545] DCMS, *Connected Growth: Manual for Places*, 2019, pp. 37–39 (p. 37) <https://assets.publishing.service.gov.uk/media/5d0276eaed915d0a7ac4de20/Connected_Growth_Manual.pdf> [accessed 19 January 2024]; 'Digital Infrastructure' <https://sdialliance.org//dictionary/digital-infrastructure/> [accessed 19 January 2024].

[546] Angeliki Tzouganatou, 'On Complexity of GLAMs' Digital Ecosystem: APIs as Change Makers for Opening up Knowledge', in *Culture and Computing. Design Thinking and Cultural Computing: 9th International Conference, C&C 2021, Held as Part of the 23rd HCI International Conference, HCII 2021, Virtual Event, July 24–29, 2021, Proceedings, Part II* (Springer-Verlag, 2021), pp. 348–59 (p. 349), doi:10.1007/978-3-030-77431-8_22.

infrastructure includes people and that considering infrastructure without the associated people is a threat to scholarship.[547]

In digital collections it is wise to consider the agency of the non-human actors as well the human. Actor network theory is a conceptual tool developed by the sociologist Bruno Latour to think about the agency of non-human actors, and the effect that they have within any system on both human and non-human actors. It has previously been employed by design historians to explain the agency of non-human actors in a network.[548] The concept of network in this context is employed as a social system metaphor.[549] This makes actor network theory a useful tool for thinking about digital images as digital objects: what they are; what they interact with; and how that affects their construction. Latour, in 'The Missing Masses', looks to designed machines to find the missing morality in society. He considers how these engineered objects continue the attitudes of those who have engineered them, actions that can be delegated to non-humans by humans,[550] but also how they bring their own agency and impact on the larger system, which then affects all actors. What is employed here is less a search for morality than a concern for the inclusion of technologies as non-human actors that have agency to affect and act upon the humans in the network. Actor network theory is used to map the networks of human and non-human actors in these designed and engineered collections and web systems.

This thesis builds on the work of others who have used actor network theory to articulate actors and systems within a digital museums context. Indeed, actor network theory has already been used to understand curation of the

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[547] Padilla, pp. 297–98.
[548] Kjetil Fallan, *Design History: Understanding Theory and Method*, English ed (Berg, 2010), pp. 66–78.
[549] Fallan, *Design History*, p. 67 quoting Latour, Reassembling the Social pp. 131-132.
[550] Bruno Latour, 'Where Are the Missing Masses, Sociology of a Few Mundane Artefacts', in *Shaping Technology/Building Society: Studies in Sociotechnical Change* (MIT Press, 1992), p. 158 <http://www.bruno-latour.fr/node/258.html> [accessed 17 January 2024].

collection at Science Museum.[551] There are critics of actor network theory,[552] but in this thesis it is viewed as a useful theory. Juhee Park uses actor network theory to understand agency and actors in museum collections management systems (CMS). Of particular interest for this thesis is how these intersect with internet networks and actors (like users of online collections). Again, positioning all actors as having agency, not only humans, Park has tried to make all actors visible.[553] Moreover, '[t]o make non-human actors (e.g., CMSs, metadata, digital design objects, online catalogues) speak, [...]',[554] the CMS is positioned as a social technical object.[555] Articulating these technical actors' voices, understanding them as social products, aids in the understanding of digital collection objects as the product of both human and non-human actors. In 'An Actor Network Perspective on Collections Documentation and Data Practices at Museums' Park asserts that their research 'demonstrates how significant it is to acknowledge the complexity of actor-networks of CMSs when understanding museums' data practices in a digital age.'[556] This thesis will articulate how CMS systems intersect with web actors such as social media platforms or web-based SMG collection tools. It seeks to articulate how these different actors and intersections create the digital object, inclusive of the shared collection image, and how these then feedback into museum practice.

Data can be framed as a valuable commodity, and collections data has not been exempt from this. In 'The value of mass-digitised cultural heritage content in creative contexts', Terras et al. map out cultural heritage data's

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[551] Laurie Waller, 'Curating Actor-Network Theory: Testing Object-Oriented Sociology in the Science Museum', *Museum and Society*, 14.1 (2017), pp. 193–206, doi:10.29311/mas.v14i1.634.
[552] Kjetil Fallan, 'An ANT in Our Pants? A Design Historians' Reflections on Actor Network Theory', in *Networks of Design: Proceedings of the 2008 Annual International Conference of the Design History Society (UK)* (Universal-Publishers, 2010), pp. 46–52.
[553] Juhee Park, 'An Actor Network Perspective on Collections Documentation and Data Pratices at Museums', *Museum & Society*, 19.2 (2021), pp. 237–51 (p. 238).
[554] Park, p. 240.
[555] Park, p. 241.
[556] Park, p. 246.

potential for value and discuss what that can mean.[557] An expansion and reframing of Padilla's collections as data,[558] they explore actions like co-creation as value.[559] Terras et al. also note the means through which mass digitisation happened. They highlight the funding and justification for the digitisation as a point of friction, and the article alludes to this being at odds with the money-making possibilities for the data in that collection now.[560] Data is valuable, as by extension is collections data, although what is of value is subjective.

Are GLAM organisations more broadly aware of the value of their collections as data? There are different kinds of value. What can be understood as valuable varies, as can be seen in the literature on museum collections. Terras et al. note that in recent years GLAM collections have been seen through the lens of the experience economy, therefore seeing them as participating in a data economy shift.[561] Tzouganatou, by contrast, situates GLAM APIs in a larger data economy: '[m]oreover, there have been discussions focusing around the current – more prevalent – model for GAFAM [Google, Apple, Facebook, Amazon and Microsoft] APIs that are in favour of the commodification of personal data and people's attention, creating platform monopolies and leading to surveillance capitalism.'[562] Introducing co-creation digital economy from Visser and Richardson, citing Whitelaw's 2019 work, 'the use of generative computational routines, using digitised GLAM collections as source material for algorithmic composites, adds further nuance to evaluating digital access to and outputs of mass-digitisation.'[563] Tzouganatou, when discussing different reasons for GLAMs

[557] Melissa Terras and others, 'The Value of Mass-Digitised Cultural Heritage Content in Creative Contexts', *Big Data & Society*, 8.1 (2021), p. 20539517211006165, doi:10.1177/20539517211006165.
[558] Terras and others, pp. 2–3.
[559] Terras and others.
[560] Terras and others, p. 10.
[561] Terras and others, p. 3.
[562] Tzouganatou, p. 350.
[563] Terras and others, p. 2; Mitchell Whitelaw, 'Succession: A Generative Approach to Digital Collections', in *The Routledge International Handbook of New Digital Practices in*

not adopting Creative Commons licensing in relation to their data, cites old hierarchies and mindsets, and different business models of monetising cultural heritage.[564] As previously discussed in the introduction, readily accessible cultural heritage materials can be used as training data for the recent explosion of generative AI models, further monetising collections in ways that will not benefit the museums that digitised and hold them, or those who originally created the objects.

Object biography has been used in this thesis as a theoretical lens through which to frame the potential migration of museum object interpretation that becomes collections metadata. Theories for evaluating online collection copies such as Walter Benjamin's ideas of Aura, which have previously been used as a theoretical lens for art and design collections, have not been used in this thesis, [565] as outlined in Chapter one. A key aspect of Aura as described by Benjamin is an object's connection to ritual and place, as many of the objects in the SMG collection are themselves mass produced products it would not be the right theoretical tool to employ here. In this thesis Arjun Appadurai's and Igor Kopytoff's ideas of 'object biography' and 'singularisation' (from *The Social Life of Things: Commodities in Cultural Perspective* [1986]) have been used as theoretical tools to understand how museum collections might intersect with social media platform knowledge graphs are important here. Looking further at the concept of copy when there are many copies, how can authenticity and the effect that copies have on it be thought about when there were many copies made of it to begin with? The SMG collection contains mass-produced objects, and using object biography will allow for the exploration of 'singularised' museum objects, of which there already exist many instances before the digital referent

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Galleries, Libraries, Archives, Museums and Heritage Sites (Routledge, 2019); Jasper Visser and Jim Richardson, 'DIGITAL ENGAGEMENT IN CULTURE, HERITAGE AND THE ARTS', 2013.

[564] Tzouganatou, p. 352.

[565] Lewis, '"Digital Surrogates": Historically Locating and Understanding the Evolution of Digitized Collection Objects in the Victoria and Albert Museum 1996-2018'.

copies are made. This research explores the potential for the object biography of the original material collection object to be carried and extended through the digital copy, or referent, in the act of sharing on social media platforms. It considers the potential for these to then be commodified in the form of data points as part of social media platforms.

A thing's relationship with commodity is an ongoing process, each (thing and a state commodity) are informed by the other. Both Appadurai and Kopytoff agree that being a commodity is a 'phase in the life of some things'.[566] Although Appadurai highlights the consumer as a destination,[567] Kopytoff describes 'Commoditization in this context as a "process of becoming rather than as an all-or-none state of being."'[568] In defining a thing, 'I [Appadurai] propose that the commodity situation in the social life of any "thing" be defined as the situation in which its exchangeability (past, present or future) for some other thing is its socially relevant feature.'[569] Appadurai introduces commodities as being socialised,[570] and agrees with Kopytoff that commodities have 'life histories.'[571] Appadurai does not agree with the commodification or singularisation binary, suggesting that there is interest to be found in the grey areas and edge cases of things existing between these two.[572] Perhaps it works better to think of something moving between phases of commodification, and one phase may inform the next. For 'singularisation' objects move in and out of being commodities, and if defined as one it does not remain the other. Singularisation can occur when an object moves out of commodification and becomes priceless,

[566] Arjun Appadurai, 'Introduction: Commodities and the Politics of Value', in *The Social Life of Things: Commodities in Cultural Perspective / Edited by Arjun Appadurai*. (University Press, 1986), pp. 3–63 (p. 17).
[567] Appadurai, p. 42.
[568] Kopytoff, p. 73.
[569] Appadurai, p. 13.
[570] Appadurai, p. 6.
[571] Appadurai, p. 17.
[572] Appadurai, p. 17.

for example when something is considered 'art',[573] or, and this is how this thesis positions singularity as a theoretical tool, if it is acquired by a museum. 'Culture ensures that some things remain unambiguously singular, it resists the commoditization of others; and it sometimes resingularizes what has been commoditized.'[574] Singularisation – as proposed by Kopytoff – occurs when objects deemed culturally important become priceless and are therefore singularised; they are still related to but move away from being a commodity. Singularisation is used as theoretical tool to understand museum objects in collections, beyond the art examples used by Kopytoff to illustrate his point.

Objects, like people, have biographies. They have an ongoing and changeable relationship with commodification, commodity being a social construct based on cultural factors which influences an object's current status as commodity or singularised or both.

> In doing the biography of a thing, one would ask questions similar to those one asks about people: What, sociologically, are the biographical possibilities inherent in its "status" and in the period and culture, and how are these possibilities realized? Where does the thing come from and who made it? What has been its career so far, and what do people consider to be an ideal career for such things? What are the recognised "ages" or periods in the thing's "life," and what are the cultural markers for them? How does the thing's use change with its age, and what happens to it when it reaches the end of its usefulness?[575]

Appadurai notes that there is a difference between social biography and cultural history.[576] Social biography is specific to an object; cultural history is how that type of object is understood by a culture and how that changes and evolves over time. Object biography is an established concept in research on material

[573] Kopytoff, p. 83.
[574] Kopytoff, p. 73.
[575] Kopytoff, pp. 66–67.
[576] Appadurai, p. 34.

culture.[577] This is where object biography, and objects moving in and out of commodity status, becoming singularised when entering into museum collections, becomes a useful theoretical tool to think about some of the objects in the SMG collections.

Objects became singularised when they get accessioned into the museum collection, but they need to have been identified as the embodiment of a part, or parts, of their object biography to do this. There are many reasons why something would have been "closed" and incorporated into the SMG collection. Figure 69 is a digital image depicting a *Porcelain figurine of a nursing sister*, shared as part of the Pinterest dataset. The figurine was part of a limited edition of 500 from the Royal Worcester Porcelain company (this can be seen from the second image in SMG collections online of the object in its box). However, from the description we can see that this was collected not as a limited-edition porcelain art piece, but rather as an object relating to the Nightingale Nursing School. Indeed, its category in the museum collection is 'Nursing & Hospital Furnishings'. It is material cultural evidence of a depiction of a trainee nurse from the 'Nightingale Nursing School [that] was set up by Florence Nightingale (1820-1910)'.[578] We see this collection object becoming singularised, as it has moved out of being a limited-edition artwork and has become a primary source relating to nursing history. As Appadurai argued, this is not to suggest that the relationship to commodity is binary, and that the object's biography is now fixed. The digitised collection object has its own biography and relationship to commodity.

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[577] Chiara Zuanni, 'Object Biographies in the Digital Age: Documentation, Life-Histories, and Data', *International Journal of Heritage Studies*, 29.7 (2023), pp. 695–710 (p. 695), doi:10.1080/13527258.2023.2215733.

[578] 'Porcelain Figurine of a Nursing Sister of the Nightingale Training School for Nurses, England, 1963 | Science Museum Group Collection' <https://collection.sciencemuseumgroup.org.uk/objects/co120837/porcelain-figurine-of-a-nursing-sister-of-the-nightingale-training-school-for-nurses-england-1963-figurine> [accessed 24 March 2024].

Object biographies of digital surrogates of existing collection objects are more complex than a continuation of the original object's biography. In her 2023 article 'Object biographies in the digital age: documentation, life-histories, and data', Zuanni suggests a 're-framing' of object biographies for the digital age.[579] Surrogates, although they 'mediate and represent the original', are their own thing deserving of their own biographies. It is important to acknowledge that there are several constituent parts of an object biography, of a physical collection object shared digitally through social media. Interactions with the shared digital museum object constitute additions to the object biography.[580] Object biography expressed through the digital object, Zuanni suggests, is present in the metadata, whether that is curatorial or recorded engagement with the digital object. She suggests the need for research expanding on lifex histories when objects are

Figure 69 - Science Museum Group. Porcelain figurine of a nursing sister of the Nightingale Training School for Nurses, England, 1963. 1984-1733. Science Museum Group Collection Online. Accessed 30 March 2024. https://collection.sciencemuseumgroup.org.uk/objects/co120837/porcelain-figurine-of-a-nursing-sister-of-the-nightingale-training-school-for-nurses-england-1963-figurine. © The Board of Trustees of the Science Museum, under a CC BY-NC-SA 4.0 Licence.

[579] Zuanni, p. 695.
[580] Zuanni, pp. 696, 702.

shared through social media, as this is an under-explored area.[581] There is, therefore, a need to understand how object biographies expressed as metadata are shared through platforms.

Museum interpretation and object biography are not the same, but elements of an object's biography can be expressed through museum interpretation. In *Acquiring metadata to support museum biographies*, Zhao et al. employ object biography again as an 'established' conceptual tool.[582] As well as creating their own object biography information through their study, they found that relevant information in existing catalogue text was useful from an object biography perspective but only in the free-form fields like 'description' and 'notes'.[583] It is the migration of these descriptive fields that is being explored through this thesis chapter. If the data points are coming from the SMG museum interpretation of the object, and Pinterest uses data to inform the knowledge graph that makes its website functional, then the museum interpretation – which may not encompass all parts of the object biography – could inform and contribute to Pinterest's knowledge graph. What are the wider implications for museum collections getting shared through social media? How are they contributing to these platforms, specifically in terms of data? In this way the museum collection gets repurposed as data – a public collection becomes data points. How people use and interact with the platform is also a factor, and this then gets turned into another data-gathering opportunity.

The Pinterest platform functions through the use of a knowledge graph. Knowledge graphs are a way of organising information through linked

[581] Zuanni, p. 696,706.
[582] Can Zhao, Michael B. Twidale, and David M. Nichols, 'Acquiring Metadata to Support Biographies of Museum Artefacts', in *Proceedings of the 20th International Conference on the Asia-Pacific Digital Libraries*, ed. by Milena Dobreva, Annika Hinze, and Maja Žumer, 2018, pp. 1–12 (p. 1), doi:10.1007/978-3-030-04257-8_31.
[583] Zhao, Twidale, and Nichols, p. 7.

data, '[t]hey combine the data management paradigms of database, graph and knowledge base. Knowledge graphs store and make searchable things and concepts based on how entities (that represent these things and concepts) relate to each other and are contextualised within the graph.'[584] The Pinterest knowledge graph is designed to anticipate user interest.[585] However, it is *not* possible to know exactly how the Pinterest knowledge graph is constructed as that is proprietary information.

The technologies of social media platforms are frequently described as 'black boxes'. A black box is software whose behaviours are hard to understand with certainty, unlike open source software whose code and operations are transparent, and therefore it is not possible to be conclusive about its construction. In their 2018 article 'Digital heritage research re-theorised: ontologies and epistemologies in a world of big data', Bonacchi and Krzyzanska express the limitations that social media platforms put on conducting research. They work as 'private black boxes', which puts serious limitations on being able to understand exactly how they function and the impact of this functionality on users. However, one can know that the Pinterest platform employs a knowledge graph, users on that platform add ('pin') existing images from the web as pins, and fields of information, sometimes pulled in directly from the web, make up their pins. When a pin is created by pinning a collection object from the SMG website, information is pulled through into Pinterest from the host website. In Figure 70 it is possible to see a flow of information from SMG collections online to

[584] Lewis, *Digital Humanities and Science Museum Group: A Landscape Study*, p. 26; 'What Is a Knowledge Graph? | Ontotext Fundamentals' <https://www.ontotext.com/knowledgehub/fundamentals/what-is-a-knowledge-graph/> [accessed 16 May 2023]; Amit Singhal, 'Introducing the Knowledge Graph: Things, Not Strings', *Google*, 2012 <https://blog.google/products/search/introducing-knowledge-graph-things-not/> [accessed 17 February 2022].
[585] Pinterest Engineering, 'Interest Taxonomy: A Knowledge Graph Management System for Content Understanding at Pinterest', *Pinterest Engineering Blog*, 2020 <https://medium.com/pinterest-engineering/interest-taxonomy-a-knowledge-graph-management-system-for-content-understanding-at-pinterest-a6ae75c203fd> [accessed 16 May 2023].

Pinterest pins. It could be inferred that metadata containing the collection object description holds a part of that collection object's object biography. Therefore, it could be suggested that in some cases object biographies of physical/material objects in museum collections are becoming data points – when they are pulled through as collection object metadata – in the Pinterest knowledge graph.

What is being commodified, and what is the relationship to commodity when museum digital image representations of collection objects become data points? If the object has been singularised once it enters the museum, it still maintains a relationship to commodity although it has moved *out* of being a commodity at that point. The museum then describes it through documentation which is made public through collections online. This documentation will be framed by the reasoning for *why* the museum collected that object. The collection object then gets represented online by its digital surrogate: the image and the collection catalogue metadata shared about that object. This digital image as a digital object inclusive of the metadata relating to the physical collection object then has the potential to get shared online through sites like Pinterest. Therefore, the object – or rather its biography[586] – again moves into a space of commodity, this time as a digital object that has the potential to contain multiple data points. Here it is information relating to museum collection/scholarship that is being commodified in the form of data. Is this a new foray into the sphere of commodity? Or rather is it unhelpful – as Appadurai suggests – to think of commodity and singularisation as mutually exclusive states. Zhao et al. note, when using object biography as a theoretical tool for museum objects that, '[a]n object can die and be reborn as it joins in and departs from relationship spheres.'[587] Something is singularised because of how it was once a commodity; this is not fixed or binary and it can be seen as valuable as a

[586] The object interpretation, as suggested before, has been crudely linked with the object biography of the physical object. However, it needs to be acknowledged that there are limits to museum interpretation and there will have been a specific agenda as to why that object will have been collected which will be reflected in the interpretation.
[587] Zhao, Twidale, and Nichols, p. 10.

commodity because of how it has become singularised. There is more potential space here to explore the digital object in its own right, its own object biography, but also its ongoing link to the original object.

Open collections data can be a prompt for control measures. There is considerable discussion in the literature about the relationship between data and control, specifically control when collections have been made available as data. *The value of mass-digitised cultural heritage content in creative contexts* acknowledges GLAM responsibility for ethically making data accessible. i.e. implementing robust processes for reuse at scale.[588]

> ‘‘The publics’ exposure to a variety of intangible cultures through social media, games and the internet has broadened discussions on the alignment of value (economic, social, environmental and cultural) with moral, ethical and societal values. GLAM communities are custodians of cultures from all of our pasts, held within both physical archives and databases. It is therefore important that they remain critical voices in this discussion surrounding value, in particular regarding how it is co-created in many forms, through many modes of engagement. However, we identify a gulf between mass-digitised content and those who could build upon it.[589]

One of Padilla’s critical provocations is that in treating collections as data, we cannot use everything for anything, there do sometimes need to be limits. He posits the potentially harmful scenario of unchecked data mining for profit.[590] What does it mean when public collection data gets used for profit making purposes?

The literature touches on tension between the creation and curation of collections data content by the GLAM organisations who made it. What happens

[588] Terras and others, p. 7.
[589] Terras and others, p. 7.
[590] Padilla, p. 297.

to this content in its new form as data and in its new contexts? There is fear around moving away from the experience economy, understanding the museum as not only a place-based, object experience, and the role that the concept of collections as data has in that conceptual shift.

> Indeed GLAMs are afraid of losing their control over their cultural data, e.g. metadata that are very well curated by the research staff, as it is in their best interest to protect them as much as possible. Moreover, they fear that when opening up their collections online, fewer people will visit their premises.[591]

Where does this fit into the broader mission of making museum collections more freely accessible? What does recontextualisation of collections data mean for the museum? How does automating control fit into wider debates and perceptions of GLAM data?

Metadata can be considered as portable (authoritative) collections data. *Making the Case for Embedded Metadata in Digital Images* situates digital images of collection objects within the practice of reuse on, amongst other things, social media websites and seeks to lay out best practices for embedding metadata. The article speaks to the possibilities of portable but fixed collections metadata.[592] The idea of self-describing digital objects speaks to longer standing GLAM collections control, for example evidential practices within archives:[593] 'In line with the increased use of registries and other online sources of information, embedded metadata should point to authoritative sources of collections management data.'[594] If the image of the collection object is being reused on social media platforms, is it being shared as a digital object inclusive of contextualizing embedded metadata? The article lays out standards for

[591] Tzouganatou, p. 352.
[592] Kari R. Smith, Sarah Saunders, and Ulla Bøgvad Kejser, 'Making the Case for Embedded Metadata in Digital Images', *Archiving Conference*, 11.1 (2014), pp. 52–57 (p. 56), doi:10.2352/issn.2168-3204.2014.11.1.art00012.
[593] Laura Millar, *Archives : Principles And Practices*, Principles and Practice in Records Management and Archives (Facet, 2017).
[594] Smith, Saunders, and Kejser, p. 57.

embedding metadata that relates to the collections. It frames cultural objects and works metadata as being largely 'categorised into the following headings; administrative, descriptive and rights data.'[595] This thesis chapter is concerned with descriptive metadata, which is positioned here as including object interpretation.

Mechanisms of onward journeys / connection to SMG

SMG museum interpretation of its collection objects, along with digital images of them, is being shared through social media as part of the digital object. What are the museum processes and infrastructures that shape this? Who are the actors? In order to talk about how SMG interpretation is shared as part of the digital object, it is first necessary to understand what interpretation means in museum studies. In particular, it is important to consider how SMG conceptualises its own interpretation, and how this has been enacted through museum processes, in order to understand the digital object that is still getting shared with a specific museum context.

Museum interpretation is information about objects in the museum's collection. It is scholarship and research relating to the objects that accompanies and contextualises them, and it situates them as evidence.[596] Interpretation may include one or all of the following: how the museum understands an object, why it has been collected, and why it is on display now. The object is recontextualised through the process of being interpreted and can exist in these different interpretations in the various sites/platforms of the museum. Interpretation is public facing and can have different forms such as text panels, as well as audio, video, interactive media, etc. The same object (e.g., one

[595] Smith, Saunders, and Kejser, p. 52.
[596] Millar.

that is mass produced) may have different interpretation in different museums, even within the same museum if it were shown in two differently themed galleries. The interpretation itself is designed to provide context for the object.

The ways in which SMG curators have conceptualised the work, display and maintenance of interpretation helps to understand the construction of it as a context. Interviews conducted for this thesis have given valuable insight into how the wider group may understand the production and use of interpretation. The then Science Museum Head of Collections and Principal Curator reflected on physically keeping gallery labels to record that interpretation.[597] The process of producing the interpretation at SMG, the reframing of objects for different formats/exhibitions, is a lens which impacts that interpretation.

> As a curator if you're sitting there doing research you might be doing research into a particular object just because you think it's a fascinating object, or that you're improving its catalogue records, or you're acquiring it for the first time into the organisation so you need to know as much information about that object as possible. And all of those things will help to develop and feed our knowledge and understanding about the collections that we hold. But then if you're doing a new temporary exhibition and it's on a particular theme, you also might look at - you will look at - particular objects that you think are relevant for that exhibition and you might research them in a lot more detail, so it's kind of so many different ways that we work with the collection. So I guess there's a kind of baseline of knowledge and understanding when an object first comes into the collection that helps build up things like our technical files. The way that we have catalogued objects in Mimsy, you know, gives us as much information as possible when that becomes part of the public collection. But then if you're doing an exhibition you might take a totally different angle to say the reason why that object had been initially acquired [...].[598]

[597] Blythe.
[598] Blythe.

Museum interpretation then is not static, rather it's an ongoing process, impacted by different internal processes and lenses through which the object can be viewed. It is an iterative exercise. There will have been reasoning as to why an object was collected and came into the museum. This has the potential to be added to and reinterpreted from different perspectives if the object is reassessed and revisited. These interpretations create different contexts for the object.

The information about collection objects has passed through multiple technologies, as part of collections management and documentation within the museum. Heritage Connector was a project that extracted meaning from text, and made connections across SMG & V&A collections using existing digital tools.[599] Reflecting on the information (the SMG collection) that the Heritage Connector project had to work with in order to build a knowledge graph, the Head of Research and Public History discussed the collections management documentation at SMG:

> You can see that the information is quite rudimentary; an inventory number, a description, source and date, file number, locations (often with many updates from over the years, along with other miscellaneous pencilled notes). To create the computer database, data processors typed-in the details from these cards. Only the typed information was entered into the database. In other words, the source of the information we use today was basic audit tools; these cards were the everyday working tools of people who had to be able to locate the objects in their care whenever they were needed to answer an enquiry or to be placed on display.[600]

What information comes from another system of recording collection, one that was designed around another purpose than digitisation? Hannah Turner's *Cataloguing Culture* explores this at length: '[...] institutional knowledge,

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[599] 'Heritage Connector'.
[600] Tim Boon and Kalyan Dutia, 'History, AI and Knowledge Graphs', *Heritage Connector Blog*, 2021 <https://thesciencemuseum.github.io/heritageconnector/post/2021/03/17/history-ai/> [accessed 16 May 2023].

particularly in museums, exists in the work of record keeping, data collection, and (today) digitization.'[601] Card catalogues and collecting lists are some of the material culture technologies that have made collections management systems and databases of museums possible now.[602] It is important to consider the impact of the evolution of systems, building upon what has gone before from a pragmatic place of not duplicating work. Any assumption of collections data neutrality should be approached critically. Some museum collection documentation practices, such as bureaucratic category application, has resulted in the continuation of colonial legacies that were present when documentation of material culture collections was first established.[603] There is potential for duplication of past violence again through museum collections data. Doing so means that legacies of decisions made for different reasons, in different times, continue through digitisation and shape interactions with museum collections.

Index cards, once used to manage the collection, are just one example of a collection technology that still has an impact over the digital objects we see shared online. Furthering this and building on the actor network theory conceptual lens introduced earlier, Park notes that 'Museum curators are expected to get along with their museum's CMS [Collection Management System] by framing their knowledge in a way that is suitable and applicable for their CMS. This is not a supportive statement for technological determinism but illustrates the agency of software.'[604] CMS software's agency has impacted the work of

[601] Hannah Turner, *Cataloguing Culture: Legacies of Colonialism in Museum Documentation* (University of British Columbia Press, 2022), p. 4 <https://press.uchicago.edu/ucp/books/book/distributed/C/bo70117236.html> [accessed 24 March 2024].
[602] Turner, p. 5.
[603] Turner, p. 5.
[604] Park, p. 241.

museum curators. Moreover, the SMG's collections online has functioned as a bridge to the museum's CMS and to new users/actors.[605]

Objects in the museum collection have become part of the museum 'system'. Their representation as digital objects reflects this process. An example of this is the work that has been undertaken as part of the 'One Collection' project. When talking about moving collection objects as part of the collections relocation, the work described is not just about photographic digitization. A key element of the move is incorporation into the SMG system. The process that the object goes through creates a digital surrogate that can be represented in different places on different platforms of the museum.

The sharing of digital objects is a process that involves infrastructures. SMG's digital infrastructure – the museum's systems – shapes what is shared alongside the collection image as part of the digital object. There is, therefore, a need to understand the SMG digital infrastructure in order to explore what is shared when an image of the collection is shared. This digital infrastructure exploration is specific to digital-to-digital sharing practices. The diagram below in Figure 70 outlines the software and databases that form the SMG's collections online infrastructure and data flow. The website is built for scale, so that large quantities of collections content can be made accessible through the site.

[605] Park, p. 244.

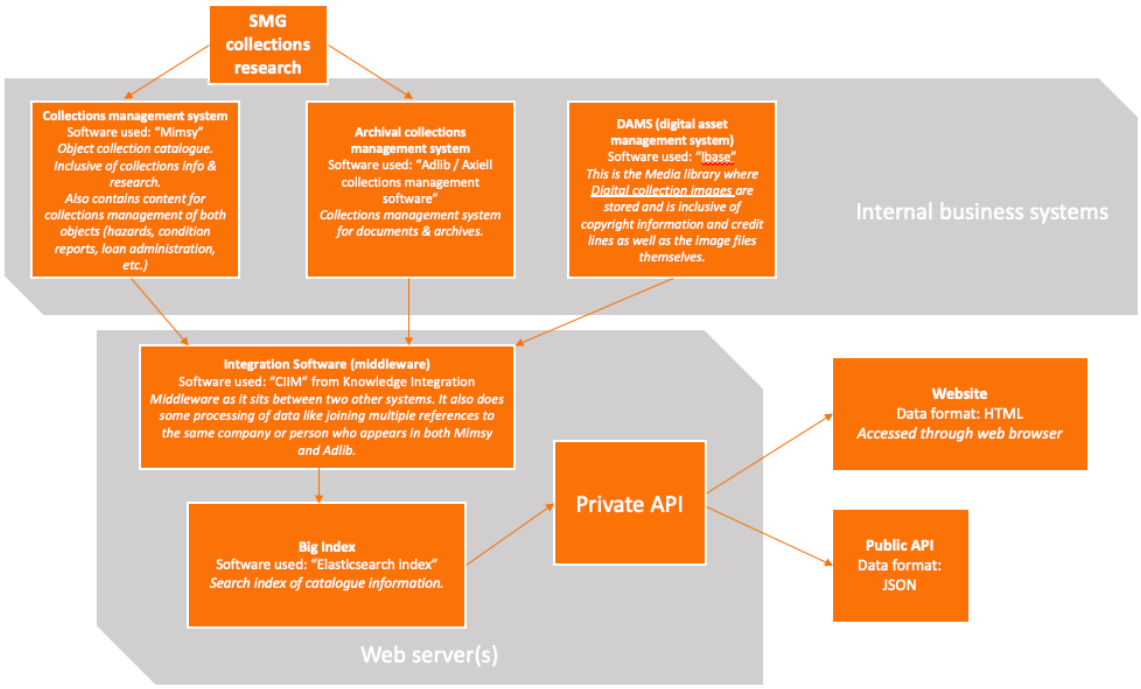

Figure 70 - Diagram showing SMG digital collections and web infrastructure, produced for this thesis.

The authority to input and make changes reflects hierarchical structures in the Group. Those who are conceived as having authority over something have the power to amend it. Although the digital team has a large impact on digital infrastructure, they are not seen as collection subject specialists and therefore do not have permissions to edit interpretation directly. Curators and collections services edit interpretation and documentation at the item level,[606] but the decisions that the digital team make in their work have affected how this interpretation is processed, presented and shared. When discussing what fields to publish to the web, Digital Director John Stack reflected on the decisions that he and Head of Digital Technology made:

> About which of those fields to put into the share sheet which is … the thing that appears in Twitter, and the thing that appears in Pinterest. But you know what? Thinking about it, we could have chosen other things. We could have chosen,

[606] Stack, 'Interview with John Stack by Rhiannon Lewis'.

> well … I think the titles are good ones hopefully. But you could have … had other things in there, like *the category* or *the materials*. And so, in a sense, it was kind of an arbitrary [decision]. It's an arbitrary thing. It's not much. You don't get much space, so you get to only have a little bit of information in there. But there wasn't a kind of big discussion about what should be in there and obviously it can be changed at any time.[607]

Decisions that were made quickly and/or pragmatically have the potential to still be in place and to affect what is being shared as part of the digital object. The infrastructure of the web is also an actor in sharing. There is, for example, a built-in browser function to make web pages shareable in a way that pulls through content.[608]

SMG infrastructures can be viewed through the lens of Latour's ideas of technology and agency. What agency does the technology have in the construction and sharing of the digital object? Where is the technology an actor in the process of sharing? Sharing involves a mix of actors: systems, infrastructure and person intervention. Tzougantou suggests that platforms should be considered as hierarchical structures because of their design and the rules on which they function.[609] The quotation below shows the process of decision-making to publish by some SMG staff, and how this is then reflected in the way the collections appear online:

> I suppose it's not sharing anything that isn't already on our collection website and therefore isn't already in our collection management system and … someone in curatorial collection services has ticked a box saying publish to web, so there is a kind of gateway back at the system level with the kind of gatekeeper to the collection, who has said, 'Yes. These fields all look good. I'm going to take the publish button' and it all gets pushed through.[610]

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[607] Stack, 'Interview with John Stack by Rhiannon Lewis'.
[608] Stack, 'Interview with John Stack by Rhiannon Lewis'.
[609] Tzouganatou, p. 349.
[610] Stack, 'Interview with John Stack by Rhiannon Lewis'.

Decisions and processes reflect fields already in existence as part of the museum databases, and default ways of working have been replicated in shareable website infrastructure. These ways of working and the processes built from them can arise because the Group, like many public museums in the UK at this time, is understaffed and underfunded and therefore needs to make the most of its resources, i.e., making optimum use of staff time and existing interpretation, and automating where possible: '[...] There's a number of objects in [the] collection where we don't know very much about the object itself, and just with mainly the sheer amount of objects that we have and the limited number of curators [...].'[611] The resource limitations are then replicated into digital surrogates, with large numbers of records having 'thin'[612] descriptions.

The digital object is a construct of many elements including: Open Graph protocol, metadata tags, and web pages that have become graph objects. The Open Graph tell the social media site what to display when the page is shared on social media, allowing 'any web page to become a rich object in a social graph.'[613] Open Graph 'meta tags' are added to the head of a web page in the page's HTML. The core set of Open Graph meta tags are: Title, Type, Image, Description and URL. There are also additional meta tags for various media types such as video and audio. These meta tags, chosen by those who create the web pages, affect what is pulled through when that web page is shared. Let's use the example of the *Hasselblad 500C/M camera*,[614] as below in Figure 71, shared and pinned as part of the Pinterest dataset:

```
<meta property="og:title" content="Hasselblad 500C/M camera |
Science Museum Group Collection" />
  <meta property="og:type" content="article" />
```

[611] Stanley.
[612] 'Heritage Connector'.
[613] 'The Open Graph Protocol' <https://ogp.me/> [accessed 20 January 2024].
[614] https://collection.sciencemuseumgroup.org.uk/objects/co15406/hasselblad-500c-m-camera-single-lens-reflex-camera

```
<meta property="og:url"
content="https://collection.sciencemuseumgroup.org.uk/objects/co15
406/hasselblad-500c-m-camera-single-lens-reflex-camera" />
<meta property="og:description" content="Hasselblad 500C/M
camera, 1978." />
<meta property="og:image"
content="https://coimages.sciencemuseumgroup.org.uk/images/42/40
8/medium_thumbnail_1978_0522__0001_.jpg">
```

Figure 71 – Open Graph meta tags for Hasselblad 500C/M camera in SMG collections page HTML.

Digital object elements have been embedded in the HTML code as meta tags. The meta tags for Twitter are slightly different, as below in Figure 72, there is no URL included:

```
<meta name="twitter:card" content="summary" />
<meta name="twitter:site" content="@sciencemuseum" />
<meta name="twitter:title" content="Hasselblad 500C/M camera |
Science Museum Group Collection" />
<meta name="twitter:description" content="Hasselblad 500C/M
camera, 1978." />
<meta name="twitter:image"
content="https://coimages.sciencemuseumgroup.org.uk/images/42/40
8/medium_1978_0522__0001_.jpg">
```

Figure 72 – Twitter meta tags for Hasselblad 500C/M camera in SMG collections page HTML.

In the above HTML, the tags of title, description and image can be seen. The meta tags embedded in the HTML of the web page inform us about what will be shared from the web page, and form part of the digital object shared through social media.

How is the structure of the digital object realised through the social media platform's user interface? When talking about the fields that are pulled through in the sharing process, the first image that represents the collection object is also

the shared image if linking that URL. Additionally the URL of the page, and any description pulled through is likely to be the one used by the SMG to describe the collection object in collections online.[615] In Figure 73 below, we can see how these specified fields in Open Graph are realised for a pin in the user interface of Pinterest. The specific Twitter user who shared it has been cropped out, but we can see that the link with the SMG Pinterest account has been established through the SMG collections URL, which is partially shown. The image of the collection object has pulled through, which is the same as the first image on the collections page,[616] as is the title of the image and the description. We see these elements forming part of the digital object, describing the collections object, in this case the Hasselblad 500C/M, in the different platforms it appears on.

[615] Stack, 'Interview with John Stack by Rhiannon Lewis'.
[616] 'Hasselblad 500C/M Camera | Science Museum Group Collection' <https://collection.sciencemuseumgroup.org.uk/objects/co15406/hasselblad-500c-m-camera-single-lens-reflex-camera> [accessed 24 March 2024].

Figure 73 - Screenshot of saved SMG collection object as Pinterest pin. Showing various aspects of the digital object that pull through and show in user interface of the pin. Screenshot taken 6 December 2020. The image cited here has been redacted to prevent copyright infringement.

Figure 74 - Screenshot of Hasselblad SMG collections online page https://collection.sciencemuseumgroup.org.uk/objects/co15406/hasselblad-500c-m-camera-single-lens-reflex-camera. Screenshot taken 19 January 2024. The image cited here has been redacted to prevent copyright infringement.

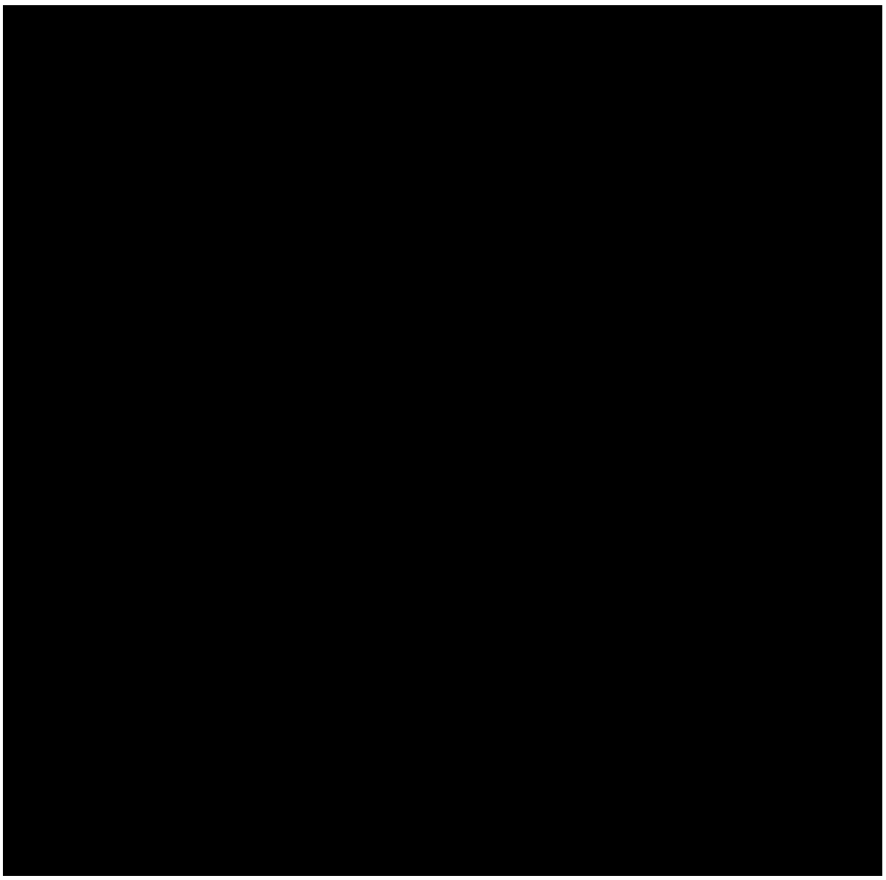

Figure 75 - Tweet example from Science Museum Twitter account. Showing digital object, inclusive of how this shows up with SMG official hashtag and URL incorporation. Screenshot taken from Twitter Conifer capture 18 November 2022. The image cited here has been redacted to prevent copyright infringement.

An automated context for collection objects can be investigated through the act of sharing. There is a difference in thinking between *explicit* sharing by museum and sharing that is *in-built* into the digital infrastructure of the website. In interviews, the act of sharing was conceptualised by staff in different ways. For example, as shown above in Figure 75, there is explicit sharing by the museum: **'**It's like an explicit action [to share] by the museum.'[617] This is contrasted with built-in sharing: **'**And then there is [where] what we've done is built into the collection. If you share … the URL on social media, it pulls through a set of information. So, I think what it pulls through is … the image. It pulls through the

[617] Stack, 'Interview with John Stack by Rhiannon Lewis'.

title. I think it posts through the description.'[618] The content that is pulled through automatically in the act of sharing is determined by a decision that has already been made and built into the online systems.

SMG staff are aware of the limitations for sharing context automatically with one of their collection objects, they have tried to encourage user journeys from social media to SMG platforms. Although this thesis does not seek to look at the social media content that SMG is putting out, the SMG social media team's knowledge of what they are sharing automatically when posting helps to understand what non-SMG accounts inadvertently share when circulating SMG content.

> We do know, as a user of Twitter and Instagram, if I get enough from the post about the thing I'm seeing then I'm less likely to click on the link, unless I'm particularly curious. So, there's a kind of balance between sharing enough information so that you're not frustrating people but not too much if you want them to go and see something more. Sometimes we don't have an onward link and so we'll share more information about that thing, and Instagram in particular is quite difficult to encourage people who view to post to then go [to] click on the link, just the way that the functionality works. So the posts where we're not as regularly encouraging people to go onwards ... there's often a lot more information ... with the image in an Instagram post, whereas [Instagram] stories [are] easier to kind of swipe up and find more so we tend to be a bit more coy with sharing lots of details.[619]

The URL may be in place to facilitate someone being able to click through to the SMG platform and find out more about the object there. The functionality of the social media platform is highlighted here and what information is automatically included varies from site to site (and even within sites, as in the Instagram article above), even if the digital team have made decisions that affect multiple sites through tools like Open Graph and Twitter Cards.

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[618] Stack, 'Interview with John Stack by Rhiannon Lewis'.
[619] Stanley.

Collection web pages are designed to be shared. The digital object has been built around the expectation that it will be shared; and the digital infrastructures shown in Figure 70 have in part been built with the expectation that content will be shared. Therefore, we can understand context as at least partially automated, since sharing is an in-built function. What will a web page look like when it is shared through social media?

> I think in the hope that people would share, and in … the full expectation that they would, and it's sort of good practice. It's on the checklist of every website for when it goes live. Interestingly, we're doing this kids website and it came up yesterday and I was like "let's quickly look at what it's going to look like if I share the URL on social media". And we were like, "we need to change that image and we need to change that text". So yeah, best practice. And [it's] good for search optimization as well, because you want lots [of] people sharing your stuff generating inbound links because that's really good for search optimization. And I think our expectation was we would, that's just how people behave, that the sharing of "I found interesting things" is what people do, and … they want to do it super quickly. I copy and paste the link in.[620]

How content will look for people is considered when designing for sharing, and how the pages will be machine readable is considered for search engine optimisation (SEO). The ease of this process is also considered: to make sharing the collection as easy as possible from a user perspective. The best practice is noted as having chosen content – like an object description – which gets as much information as possible so that web pages have been search optimised, in the expectation that they will be shared. In this way, for an actor that is non-human (i.e., SEO), SMG collection object context has been automated.

What is the context for collection objects? As noted earlier in the chapter, SMG collections infrastructure and processes did not always confront curators

[620] Stack, 'Interview with John Stack by Rhiannon Lewis'.

and interpretation producers/writers with the need to think about varied contexts and sharing; about how that collection object might be encountered outside of museum sites and working spaces. In interviews, multiple staff referenced new digital tools created to allow access to the collection and described how this had prompted them to rethink context for collection objects, whether consciously or not. SMG staff contributing to object interpretation through the offline database are potentially unpacking what is perceived as context for the digitised collection object.

> I think it's definitely something interesting about curators filing in Mimsy and Adlib. And thinking about the context really being the collection website rather than **everything else that might happen beyond that.** I mean Google Images is another place this stuff shows up. It's really interesting and how you might think about things slightly differently if you [did consider this], but they're probably too busy to do that, so no.[621] [My emphasis].

It is Stack's perception that information is added to digital catalogues in the expectation that the collections website is the sole context. How things are recontextualised is not thought about, or rather it had not been thought about until digital tools like MIAT and ROG.

New digital collections tools have prompted SMG to staff to move away from 'normal' thinking, from only thinking about the context whilst on museum platforms. Will Stanley, when talking about ROG and MIAT, noted: 'And so for those projects having just a vast number of images of collections has meant that actually they show some of the hidden gems, and the breadth and depth of the collection in a way that we've not been able to do before.'[622] Digital tools can serve to provide new context and offer different ways of exploring collections. Something as small as accessing the same collection through a route other than collections online prompted revaluation by staff because it did not involve the

[621] Stack, 'Interview with John Stack by Rhiannon Lewis'.
[622] Stanley.

same access patterns. Perhaps the non-intentional step of having the collection object generated for them has made SMG staff reassess what accessing the collection may be like for remote users/visitors.

Interpretation migration on Pinterest

This section describes the make-up of the digital object, which the image of the collection item is a part of. In looking at *how* the image of the collection object is being shared, we can also understand what other information and metadata is being shared as part of that process. The shared images collected in the dataset for this thesis are used as the entry point for exploration, providing insights into what is getting shared across platforms along with the image. Specifically, what collections interpretation is getting shared with the digital image of the collection object, and in what form is this getting shared?

Metadata can migrate with the digital image of the collection object when it is shared to Pinterest, but this is not always the case. To understand what, if anything, had migrated Pinterest was first considered as the digital-to-digital main case study. As the focus of the research is on more deeply understanding the digital object, when processing and analysing the Pinterest dataset it was initially refined to unique pins.[623] This ensured that the results reflected the pins as unique digital objects, which could then be analysed to determine how much metadata is migrating from the Science Museum Group collection platforms to the Pinterest platform. From close reading of the dataset there was similarity (see below) between two metadata fields: 'data note', which came from the pin digital object on the Pinterest platform; and the 'mini description' field associated with the SMG Collection object that originated from collections online. These fields

[623] This was done by removing duplicates in Excel, using the pin URL field as a unique identifier to do so. 951 duplicates were found, leaving a dataset of 399 unique pins.

were then tested to see if collection object information (interpretation) from SMG collections online could be found in the Pinterest pins.

Migration of digital image object metadata was tested. Digital object metadata fields from both platforms were compared using a one-to-one comparison. The project used OpenRefine to process and analyse data. The pin 'data note' and SMG 'mini description' metadata fields were downloaded from the OpenRefine master dataset, along with URLs acting as the unique pin identifiers. Duplicates were removed in Excel, and these were then reimported into a different OpenRefine project for processing. OpenRefine supports the Python programming language, and two Python libraries – difflib[624] and more specifically 'SequenceMatcher'[625] – were used to automatically test similarities between the pin 'data note' and SMG 'mini description' fields. These metadata fields were treated as strings in order to undertake this similarity testing. The pins were sorted into different levels of similarity to understand how the dataset broke down into defined levels of similarity, as can be seen in Table 10 - Table of similarity findings between metadata fields Pinterest 'pin note' and SMG 'mini description'. Using the 'add column based on this column' action, and treating the fields of data as strings, any trailing or leading white spaces were removed and everything was transformed to lowercase. These different fields were then treated as strings of data to compare and create a ratio of similarity using OpenRefine's in-built Python Libraries and the Sequence Matcher in the difflib library. These ratios are given a tag describing their level of similarity. These were generated using the code below in Figure 76 with the exception of 'same subject matter' which was hand-tagged by the researcher from the no-match field (indicated in Table 10). Threshold configurations were tested and adjusted, and score tags were changed from the original code in order to better represent the

[624] 'Difflib — Helpers for Computing Deltas', *Python Documentation* <https://docs.python.org/3/library/difflib.html> [accessed 18 September 2023].
[625] 'Difflib — Helpers for Computing Deltas: SequenceMatcher Objects', *Python Documentation* <https://docs.python.org/3/library/difflib.html> [accessed 18 September 2023].

complete dataset, although spot-checking of the different categories showed the process to be largely accurate, there were matches not being flagged. These were either left as no match, or hand tagged as described.

```
import difflib

column1 = cells['Pinterest_pin_data_note']['value'].strip().lower()

column2 = cells['mini_description - SMG Collection
object']['value'].strip().lower()


score= difflib.SequenceMatcher(None, column1, column2).ratio()


if score == 1:
   return "match"
elif score > 0.9:
   return "very similar"
elif  0.7 <= score <= 0.9:
   return "similar"
elif 0.5 <= score <= 0.7:
   return "quite similar"
elif 0.3 <= score <= 0.5:
   return "some similarity"
else:
   return "no match"
```

Figure 76 - Python code run in OpenRefine to compare 2 data fields as strings.

There are limitations to the dataset, and therefore there are limits to determining metadata migration. The similarity thresholds tested and detailed in Figure 76 were set very low because multiple data transformations have introduced some errors. The pin 'data note' and SMG 'mini description' metadata fields have been through multiple different software and file formats at different points, not only by the researcher in the processing and analysis (OpenRefine, Excel, csv, etc.) but also potentially by the Pinterest user who created or repinned the pin. This has resulted in the appearance of seemingly random characters in the dataset (but only in the pin 'data note' field). Some of the data from Pinterest is in different languages. In the pins data there are also file names that have pulled through, and become pin descriptions, for example 'hommedia.ashx' is a common one.[626] There were blanks in both the Pinterest and SMG fields, meaning that matches or similarities could not be found.

Table 10 - Table of similarity findings between metadata fields Pinterest 'pin note' and SMG 'mini description'

Range of metadata description match	**Count of unique pins**
match	19
very similar	20
similar	14
quite similar	56
some similarity	83
same subject matter (this field was hand tagged, results not from python code)	66

[626] It has been suggested by John Stack, SMG Digital Director, that these may be file paths in Brought To Life where the images were in some cases rendered on the website by this code.

no match	141
total	**399**

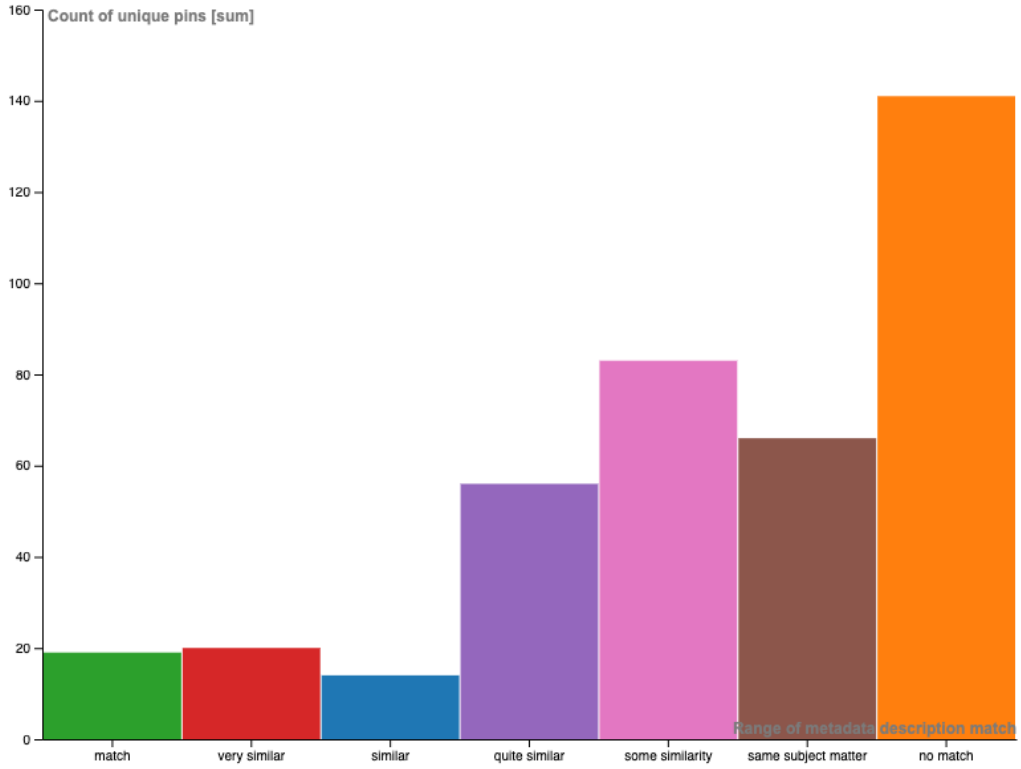

Figure 77 - Bar graph showing the number of unique pins, their level of similarity of matching metadata to the SMG mini description information.

The majority of pins have some similarity in their metadata, reflecting how the collection object is described in collections online. The 'mini description' is only part of the way in which collection objects are framed in collections online, but by comparing similarity between two fields of text strings, it is possible to test for the migration of information. A large proportion of the fields do not have matching information because there was no content match. The number of pins with exact metadata migration is very low: only 19 pins. From looking at Table 10 we can deduce that there is, however, a majority of pins with a match or that have some level of similarity: 258 of the total 399 pins (65%), compared to the 144 with no match at all. Figure 77, and the sequence matcher code in Figure 76, show

that the similarity of metadata falls on a spectrum. Metadata fields may not be shown in the code to be a 'match' or 'very similar' because they are a different string length, or because a special character was included. Table 11 provides an example of fields related to the same object that only show up as 'similar' according to the applied criteria.

Table 11 - Metadata identified as 'similar'.

Pinterest: pin data note	**SMG Collection object: mini description**
Poster, Southern Railway, The Devon Belle by Marc Fernand Severin, 1947. Coloured lithograph depicting the rear of a speeding train, blurred by motion, with an observation car with large windows as the last carriage. The train is travelling through a light, almost monotone, landscape. At bottom right is a timetable for services between Waterloo station and Sidmouth Junction, Exeter Central, Ilfracombe and Plymouth Friary stations. Beneath is the text "New!, All-Pullman trains to the ...	Poster, Southern Railway, The Devon Belle by Marc Fernand Severin, 1947. Coloured lithograph depicting the rear of a speeding train, blurred by motion, with an observation car with large windows as the last carriage. The train is travelling through a light, almost monotone, landscape. At bottom right is a timetable for services between Waterloo station and Sidmouth Junction, Exeter Central, Ilfracombe and Plymouth Friary stations. Beneath is the text "New!, All-Pullman trains to the West of England with observation car. Southern Railway and Pullman Car Company." Printed by the Baynard Press, London. Format: quad royal.

The object descriptions in Table 11 are almost exactly the same, but they are shown as not an exact match. Using the methods described it is possible to see that the character limit was cut off on the Pinterest data note, accounting for the registered difference. For some of the fields that have been found to be

comparatively less similar, it is still possible to see that they are referencing the same contextualising information about the object. This might be because the information on the SMG collections online pages has been updated or reworded since the object was added to Pinterest, or that information is pulled in from a different data source on collections online. Given that both of these fields are describing the same objects, sourced from collections online, it is the form in which metadata is migrated that is of interest. If it is not a match, how has it been changed? Has the text been translated into a different language, but still looks to contain the same or similar content? Has there been noticeable intervention from the Pinterest user who created the pin, or does it look like the information has been automatically transferred across? Understanding this will aid in understanding if and how museum object interpretation is shared as metadata.

With the vast amount of recontextualisation going on through boards rather than pins, it is not always the case that there will be complete similarity of description. There are some pin descriptions where there has been intervention from the Pinterest user, the information about the object is still transferred across from SMG. One user reflects, before introducing the object: "I see a novel here: Life size wax head of a melancholy insane woman, England, 1910-1950". The same information has been pulled through from collections online, but with a personalised introduction. Another user includes hashtags in their pin description, an affordance and behaviour from other social media platforms.[627] There are examples of complete recontextualisation that interpret the object from the perspective of the Pinterest user – "love vintage design" is an example of personal framing of a collection object.

In conclusion, for Pinterest, it is clear that migration of metadata, and specifically collection object interpretation, is occurring. This pulling of collection

[627] "Anatomical drawing of a human skeleton, England, 1840 #anatomy #skeleton"

information from SMG collections on to Pinterest is interesting because it shows that in sharing through social media, the digital collection image can be a composite. There is the image itself – the visual image – but the representation of the collection object is also shared as part of the whole digital object. The digital image and its accompanying metadata are one digital object. Therefore, the digital image of the collection object that is shared through social media is inclusive of collection interpretation as provided by the museum.

This only takes place when the collection images are being shared through digital-to-digital sharing. If the image is shared through physical-to-digital sharing, the metadata connection is lost and new metadata relating to that physical encounter is generated and stored – for example, what device was it taken on, when was the image taken, what is the resolution, where was it taken, in what file format? – rather than description of the collection object, image size, etc.

Pinterest pin metadata is a good place to understand collection object recontextualisation. There is migration of collection interpretation happening, as part of the digital object, when the image is shared. So, the digital image brings some contextualizing information with it when digital-to-digital sharing occurs. Digital images are being shared with metadata beyond the image that is pulling through, in this case collection object information. It appears that there has not been much intervention at this point to edit this information. Museum interpretation is not static; it can change and be updated as new research frames that collection object. This may not be reflected in the older pins, which are contextualised by older collections information. The intervention by Pinterest users to provide their own contextualisation of the objects happens through the construction and naming of boards rather than pins. This could also be described as ‘curating’ behaviour from Pinterest users. Having considered the sharing of

museum interpretation via Pinterest, this chapter will now turn to the second social media platform studied in this thesis: Twitter.

Interpretation included Twitter

There are multiple ways in which SMG museum interpretation can be included when tweeting an image of an SMG collection object. Firstly, a user might tweet a link to a collection object, and because of the nature of the Twitter user interface at the time of fieldwork, the collection object's image and some metadata will have pulled through and been integrated as part of a social media link panel. When clicked this panel will link back to the associated collections online page. This is very similar to the automated social media tags method that Pinterest uses.[628] As noted above, in the section on Open Graph and metadata tags, metadata tags from the Twitter card pull through when a link is added to a tweet,[629] including URL, title, description and image. This impacts how the SMG collection will be shared and contextualised through Twitter. The nature of the cleaning process used for the dataset, which only includes tweets with a digital image, meant that if a digital image was included it overrode the automatic pull through of an image from the collection page as per the metatag HTML. Consequently, these would not have been present in the dataset.

The collection interpretation that featured in the dataset therefore came in two main forms. First, there are onward links included in the tweet which would link back to museum platforms and museum resources, such as an object-focused blog post or collections online object page. In the master Twitter dataset there were 19 onward links to URLs connected to the museum, represented in the

[628] Cyrus Shepard, 'Must-Have Social Meta Tags for Twitter, Google, Facebook, & More', *Moz*, 2013 <https://moz.com/blog/meta-data-templates-123> [accessed 24 March 2024].
[629] 'About Twitter Cards' <https://developer.twitter.com/en/docs/twitter-for-websites/cards/overview/abouts-cards> [accessed 4 January 2024].

dataset by 36 individual tweets. Of those, 13 were collections online links, represented by 19 tweets in the dataset.[630] Some of these are chatty updates that include the links/image as the punch line to the tweet text. Some of them are from accounts that have a historical or heritage object theme/focus, introducing the object in the tweet text, contextualising it with object information and including onward links to the collection site and hosting museum, as well as the digital image(s). The account 'Our_objects', which from its user description at the time was 'Telling the hidden histories of disability and mental health through museum objects. (Not affiliated with any museum)', shared six tweets and objects during the period of data collection. They all follow a similar format of naming the object, introducing the object, tagging the Science Museum, and including an onward link and images sourced from the Science Museum Group collections online. This interpretation in the tweet text requires action from the Twitter user to form the text in this way. This is one way in which interpretation can be included in the digital object of the tweet: through onwards links to further interpretation on SMG platforms.

Interpretation can also be included in the tweet image, taken and shared from inside the sites and exhibitions of the Group. There are a total of 25 unique images in the Twitter dataset that show SMG collection object images either contextualised by interpretation or appearing in the same image framing as interpretation. The following examples are mostly from the Science Museum, as that reflects much of the dataset.[631] Interpretation can be inclusive not only of collection catalogue information (e.g. title, date, medium, etc.), but of stories and first-hand accounts relating to the displayed objects. Tweet images can include quotes that contextualise the objects. These are visible in the way the photographer has chosen to frame the collection object with interpretive text and information. For example, the picture in Figure 78 of objects from the SMG's

[630] The master Twitter dataset had 1,794 tweets in total.
[631] Of the images in the dataset 22 are taken at Science Museum, 2 are taken at the National Science and Media Museum, 1 is at Locomotion and 1 is at the National Railway Museum. Six images are from the *Top Secret* exhibition at the Science Museum.

computer collection on display is contextualised by a quote from and images of Alan Turing. The Twitter user is choosing to include the curatorial framing of the collection objects that the SMG has used to contextualise the objects in the exhibition.

Figure 78 - SMG's computer collection objects on display in glass cabinet with interpretation. Including image, short biography of Alan Turing, and quote from Turing over a black and white image of men gathered around a computer. Further interpretation visible. The image cited here has been redacted to prevent copyright infringement.

Figure 79 - Replica of Morse's second model of telegraphy apparatus, in gallery with interpretation in the background. Image, short biography of Samuel Morse with a quote from him. The image cited here has been redacted to prevent copyright infringement.

Framing of the collection objects might include multiple forms of contextualising information. The example in Figure 78 includes the display case, multiple objects, as well as biographical and object information. This is in a similar format to the tweet image in Figure 79 that shares a Replica of Morse's second model of telegraphy apparatus,[632] with biographical information about inventor Samuel Morse and test text sent through the machine. The collection object is front and centre of the image. The text reads 'The fest [*sic*] "Hello, world!" was actually "Attention, the universe!"' The Twitter user is contextualising the invention of morse code within a timeline inclusive of the famous computer code 'Hello, world!', drawing a line between the two phrases and communication through and with machines.

[632] 'Replica of Morse's Second Model of Telegraphy Apparatus, 1934 | Science Museum Group Collection' <https://collection.sciencemuseumgroup.org.uk/objects/co33234/replica-of-morses-second-model-of-telegraphy-apparatus-1934-telegraph> [accessed 24 March 2024].

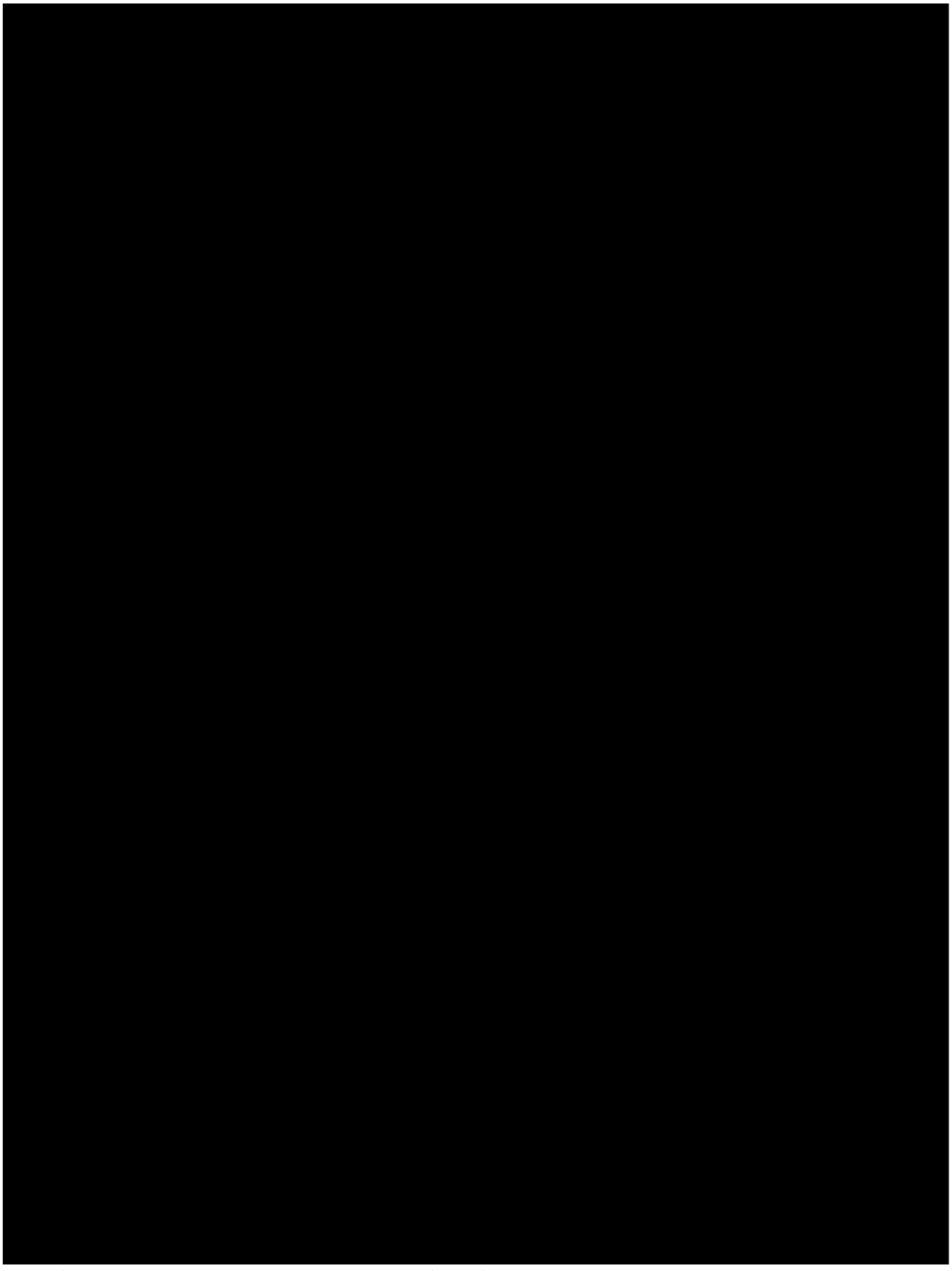

Figure 80 – Image of mounted thermoplastic radiotherapy mesh mask below quote from Roger Pebody whose mask it was. 2018-493. Science Museum Group. The image cited here has been redacted to prevent copyright infringement.

Exhibition design and interpretation find themselves reflected online when shared through social media. The example in Figure 80 shows the framing of the object in the exhibition design at the museum and the contextualisation of the exhibit, in this case the then newly opened Medicine: The Wellcome Galleries.[633] This is a curated moment in the storytelling of the broader medicine galleries, which the Twitter user has chosen to capture and share themselves. It shows a radiography mask used to target radio waves during cancer treatment, so that they can be directed to the cancerous cells that need to be treated. The object is displayed on a deep red background, with lights highlighting the object and a quote which describes the personal experience of undergoing treatment with use of the object. It is an aesthetically pleasing, poignant composition that contextualises the object within its use and allows you to understand and relate to the use of the object. This is curatorial design and research work that has been done by SMG becoming contextualising work that is now shared through Twitter.

Interpretation can be included as a by-product of trying to capture a picture of the object. Two of the pictures in the dataset, both taken at the Science Museum, are accompanied by tweet text that reflects on how objects from the users' childhoods are now objects in the Science Museum, showing the evolution of communication computing (see Figure 81 and Figure 82). With these images, the interpretation is included as that is how they have been exhibited: it is a full display with numerous objects, object labels and some descriptive text. However, when you contextualise the images with the tweet text, one sees they are nostalgically reflecting on the objects shown; the dates and names of the computers and consoles being included could add to the point/feeling that the Twitter user was trying to share with the tweet. In Figure 82, we see that museum interpretation is clearly visible but it is not of the object that the user is trying to highlight and share; it is part of the broader background, a contextualising

[633] 'Medicine: The Wellcome Galleries | Science Museum' <https://www.sciencemuseum.org.uk/see-and-do/medicine-wellcome-galleries> [accessed 24 March 2024].

location for the collection object to be photographed. The objects stand out by themselves in the image, combined with the lived experience of the Twitter user expressed through the tweet text.

Gallery interpretation may be included in the image as it is needed to show an aspect of the object's biography. Six of the 25 images of the collection are from the exhibition *Top Secret*. This is a small sample from which to draw fixed conclusions, but the prevalence of the *Top Secret* exhibition objects included in the 'image' subsection of the Twitter images dataset may suggest that because the objects are secretive, their true nature concealed, without explanation they appear ordinary. That is why they were curated in the exhibition in such a way. In Figure 83 we see a computer, which we might expect to find in many other computational displays within the Group. However, this computer is within the *Top Secret* exhibition and it is actually the infection of the computer with the WannaCry worm that is the reason for displaying this object. The Twitter user has here shared the object's story and the research interpretation of it by curators, because how it has been contextualised and described is what makes it interesting to share. The printing on the object label affiliates it with the museum and its research processes, lending it weight as authoritative content that might not be there if it was only contextualised within tweet text. Two separate images of the *My Friend Cayla doll* are present in the dataset, one shown in Figure 84. The tweet does not include a lot of text but alludes to the TV show *Black Mirror*. The explanation of the object through interpretive text contextualises the doll within the exhibition and explains its relevance in this context. Without the text we might understand it just as an average children's doll rather than a potential surveillance tool.

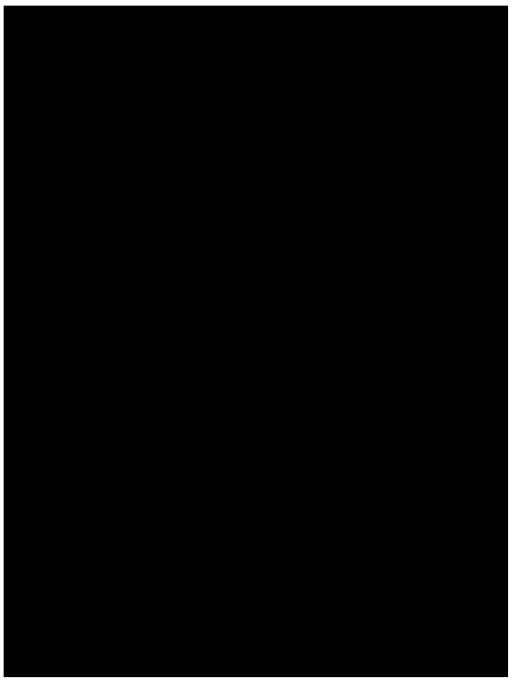

Figure 82 – SMG collection objects evolution of communication computing in display cabinet alongside interpretation, including Nintendo Gameboy. "My childhood is now on display @sciencemuseum 😀🤣". The image cited here has been redacted to prevent copyright

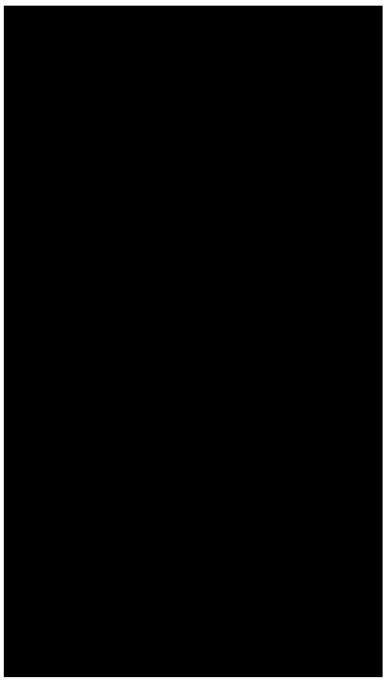

Figure 81 - SMG collection objects evolution of communication computing in display cabinet alongside interpretation, numerous collection objects in shot. "When things from your childhood are in @sciencemuseum #old". The image cited here has been redacted to prevent copyright infringement.

Figure 83 – Computer infected with WannaCry worm installed in Top Secret exhibition at Science Museum with interpretation. The image cited here has been redacted to prevent copyright infringement.

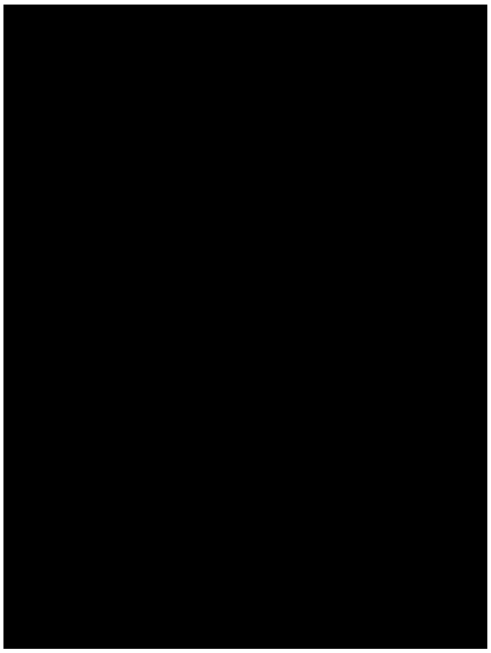

Figure 84 - My Friend Cayla doll installed in Top Secret exhibition at Science Museum with interpretation. The image cited here has been redacted to prevent copyright infringement.

Image policies - controlling context

> ***'We don't want them appearing out of context*** *because it can be distressing to some people and generally that is the ethical direction that museums seem to be moving in.'*[634] [My emphasis].

For digital-to-digital sharing from the museum it could be argued that the context comes along with the digital object. Although it is no longer represented online through the museum's user interface it is still found represented in the object's metadata and the digital object. It now appears on a different digital platform, in this case Pinterest, but there is potential for the context to exist in multiple places. On SMG platforms, SMG collection photography has been contextualised by museum collection interpretation. What can we learn about how the SMG has understood recontextualisation through its internal image policies, which guide employees' activities and therefore shed light on institutional thinking.

This section first looks at the policies that have been produced around digital image publishing by the SMG and analyses what they say. It also considers the projects and outputs that prompted them to be produced. What have these documents formalised as policy in relation to how the SMG sees digital object records and catalogue information as mechanisms for contextualising digital images of collection objects? The section then goes on to explore the culture of openness present at the SMG, within which these policies were produced. How does the SMG conceptualise openness for digital images of its collection, and what internal systems have been built upon or utilised in order to publish digital images online? Finally, it looks at specific collections and objects within those collections to understand changes over time for collection objects.

[634] Humphreys.

The SMG created a policy for publishing its collections images online, formalising this into an internal policy document in September 2020. Titled 'When not to publish images or records online: Guidance Document',[635] it lays out policy for when, 'in some rare circumstances, it is not appropriate to publish a photograph of an object (or, even more rarely, an entire object record).'[636] An example given in one of the interviews to demonstrate these policies in action was that of collections content depicting the disgraced radio and television presenter Jimmy Savile. In that instance, a collection object record is available but it is no longer illustrated with a collection image.[637] The report also details specific cases of when to publish image sources, which show the importance of contextualising content that relates to difficult histories.

> However, we do publish images such as those taken by Zoltan Glass in the 1930s of Nazi era events, like 1991-5018/2539 – an image of civilian spectators giving the Hitler salute at the Nurburgring in 1934. The catalogue description acknowledges the salute as a mandatory greeting, and contextualises the image.[638]

This shows the power of catalogue descriptions and their ability to contextualise collections content. The guidance also assumes that the image will always be contextualised by the museum. The document outlines that the decision of whether or not to publish sits with curators at SMG. It therefore shows where agency to make direct change and decide whether to publish sits within the SMG staffing structure. Ways of working have been influenced by tools and projects that have caused SMG staff to be reflective about the context and content of the collections.

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[635] SMG.
[636] SMG, p. 2.
[637] Humphreys; For example 'DVD-R "BRB 1980's The Age of the Train" | Science Museum Group Collection' <https://collection.sciencemuseumgroup.org.uk/objects/co8907706/dvd-r-brb-1980s-the-age-of-the-train-dvd-r> [accessed 24 March 2024].
[638] SMG, p. 6.

SMG collection projects have acted as prompts for reflection on museum working practice. One such project that caused reflections on content and its scale was 'One Collection'. Mentioned previously in the thesis, 'One Collection' is a multi-year amalgamation of the collections from across the Group to the new storage facility at the National Collection Centre in Wroughton. A significant part of this project involved moving the Science Museum Group's collections out of the previous store at the government-owned Blythe House in London, which was being sold.[639] This was used as an opportunity to incorporate digitisation into the workflow of cataloguing and moving, leading to mass digitisation of the collection. This in turn led to reflection by staff: 'It's really as part of the 'One Collection' project that we've had to really formalise this stuff [...].'[640] Time was dedicated to thinking through and formalising ways of working with edge cases or exceptions, forming policies for digitising and deciding on whether to make public complicated collections objects like human remains or those including obscenities.[641] A project that provokes changes in ways of working does not need to be on a grand scale, like 'One Collection'. Smaller projects have prompted shifts in staff perspectives. Relatively small digital tools, for example, have acted as a catalyst for change interviews with SMG staff conducted in 2020 and 2022 indicate that reflections on professional practice for digital collections were prompted by public online tools designed to increase collections engagement and discovery. These tools were based on there being a reservoir of digital collection images,[642] and designed to provide a way into the collection for people who were not entering with something particular in mind. These kinds of tools – generous interfaces –[643] are still part of museum practice and output: 'They've [ROG and MIAT] also changed our policy though on photographs as well; they've

[639] 'Autumn Statement Brings Relief but Also Unanswered Questions for the Arts', *Apollo Magazine*, 27 November 2015 <//www.apollo-magazine.com/autumn-statement-brings-relief-but-also-unanswered-questions-for-the-arts/> [accessed 24 March 2024].
[640] Stack, 'Interview with John Stack by Rhiannon Lewis'.
[641] Stack, 'Interview with John Stack by Rhiannon Lewis'.
[642] Humphreys.
[643] Mitchell Whitelaw, 'Generous Interfaces for Digital Cultural Collections', *Digital Humanities Quarterly*, 009.1 (2015) <https://www.digitalhumanities.org/dhq/vol/9/1/000205/000205.html>.

made us realise we've got to take some photos down. We haven't talked about that actually not publishing photos.'[644] Encountering SMG collection images outside of museum platforms prompted reflection on their possible recontextualisation.

The ROG has confronted SMG staff with a collections recontextualisation. It forced them to think about recontextualisation of museum collections because it operates in a web browser, and uses are therefore not viewing them on SMG websites like collection online or in the physical museums. This was not the intention of the ROG but it has resulted in reflection from staff on working processes:

> And so it's definitely thrown up conversations because Museum in a Tab Chrome thing is just random. Randomly give me a thing with an image, is essentially what that API call is, anything with an image. And what it meant is some stuff appears uncontextualised, so there's problematic stuff in the collection that needs contextualization. And there's no way of having a, there's no current way, because people have sort of said "Ohh, I suddenly saw that and the thing in the Museum in a Tab and can we make sure that doesn't appear again?" To which the answer is actually no we can't but ... [the] chances of ... you seeing it again are pretty low. Because it's like one in 150,000. But it means that... These new contexts in which things appear are actually outside of our control, and it's therefore harder to contextualise stuff so you know there's been discussions at various points around [it].[645]

The ROG did not approach the collection with a predetermined search (only that an object must have an image) and therefore it returned random objects. It was also accessed through the browser, an environment outside of the museum context, which seems to have prompted reflection on how others may view the digitised collection. The ROG has been a catalyst for discussion around control, and the drive or duty as a museum to contextualise.

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[644] Humphreys.
[645] Stack, 'Interview with John Stack by Rhiannon Lewis'.

The practice of contextualising through research and cataloguing is an established one. Interviews suggest limiting the release of images, which runs counter to the SMG's aim to get as many images out as possible, and prompts consideration of the potential lack of context for collection objects:

> [Talking about the policy document that deals with not publishing things online]. It's a tiny, tiny percentage of the overall, as always the guiding principle is we publish as much as we can, and very often good cataloguing – putting something into context even if it is sensitive or offensive [glitching] or difficult to understand from the photograph – **good cataloguing will help. But occasionally that's not possible and we would consider it to be irresponsible to publish the photograph and to be honest the Random Object Generator and Museum in a Tab because we've all got those, they very often have driven us to think, "I don't think that should be appearing randomly without context."**[646] [My emphasis].

The formalising of when to publish records online prompted by use of the ROG and MIAT tools also speaks to the importance of what is included in museum object records. The digital object record accessible online has the digital image(s) of the collection object, but also contextualising information in the form of catalogue data giving a basic description, as well as descriptive data that describes and contextualises the object, locating it within history and within the SMG's rationale for collecting it.

The SMG digital team had an ethos of openness for access to their collections. What has been noted so far are efforts to control what gets published and what does not. However, it is important to emphasise that SMG has committed itself to continue to put a lot of digitised collection content online that can be shared and recontextualised. How are those digitised collections being put out there and how is that thought about by staff?

[646] Humphreys.

> So, in a sense, it's part of the same thing. Open content licences, open data, public APIs, social sharing things. They're in a sense, they're all part of the same ethos, which is around openness and allowing reuse and pushing things out into the world, so that the content has a life beyond our own platform.[647]

The SMG ethos of openness was not limited only to digital collection records but influenced digital practices and infrastructures more broadly. When questioned directly about the ethos of openness and allowing reuse, about that being part of the remit of a public museum collection, SMG Digital Director John Stack reflected:

> The purpose of putting it online is for public engagement, scholarship, research, enjoyment, education. All of those things are benefited by [a] more open approach to the content; by Creative Commons; by open data; by the API; by social sharing. Because in the digital world, there's a sense in which thinking of your digital presence as just something that happens on your own website is now sort of too narrow.[648]

Demonstrated here, then, is an open approach to collections content. The SMG was working from an understanding that the collections website is the first step in the digital object's journey. There was an understanding that if appropriate mechanisms were put in place, like CC licensing on collections images and data, and making the API open, they would facilitate sharing digital images further.

SMG staff built their digital policy on existing work, basing policy documents on established processes and staffing structures. These working systems were built upon with digital systems and content, for example work already done by curators to categorise images as ready for publishing. It was thought that if SMG curators had already put an image online, then it was considered as being 'republished'. This cut down on time making decisions about what to publish from scratch, and collection object web pages could then be

[647] Stack, 'Interview with John Stack by Rhiannon Lewis'.
[648] Stack, 'Interview with John Stack by Rhiannon Lewis'.

made as visible as possible through SEO, so that people could find them, and find them of interest.[649] The digital image had already been made public as part of the digital record and was now being made more easily findable online in accordance with the drive for enhanced accessibility. As noted already with the collection image policies, this was a catalyst for the formalisation of policies and taking stock: 'And so doing it at scale ['One Collection' project] meant we have to revisit all of the policies, what's being published, who can tick the box, what things don't get published.'[650] Therefore, although the 'One Collection' mass digitisation images are out of scope for this research, as it took place during the collection of images for the primary datasets, this moment of reflection and ratification of image policies at the SMG is revealing of how the SMG thinks about publishing its digital images and what systems these image-publishing mechanisms have been built upon.

The SMG published images generated as part of 'One Collection', and also built on digital collection images published from existing digital assets and projects. For example, many images in the SMG collection already had open sharing mechanisms/policies/licensing in place as part of the earlier *Brought to Life* project:

> And because the museum had already adopted some Creative Commons licenses specifically for the Brought to Life project, which was the ... most recent digitization which had Creative Commons licenses – because they've been used there, we took that to be an implicit policy decision, which we then applied to everything.[651]

Around a third of all the pin images from the Pinterest dataset were from *Brought to Life*, as documented in Chapter 4. Some of the pins had been circulating on the platform for over ten years. Indeed, six of the top ten most shared Pinterest pins shared came from *Brought to Life*. Although Pinterest users are not necessarily

[649] Stack, 'Interview with John Stack by Rhiannon Lewis'.
[650] Stack, 'Interview with John Stack by Rhiannon Lewis'.
[651] Stack, 'Interview with John Stack by Rhiannon Lewis'.

paying attention to Creative Commons licences and image reuse, the legacy of publishing these images online, back in 2009,[652] has had an effect on larger digitisation projects that make digital images from the SMG accessible (i.e., 'One Collection'). The project also has a legacy on social media platforms, where the images are shared and reshared, encountered on the social media platform Pinterest.

In conclusion, providing context is seen as part of the work of the museum. SMG policies have shaped what is being shared in terms of both interpretation and shareable content, as well as shaping context. Understanding the formalising of image policy around when **not** to share gives valuable insight into how SMG contextualises its collections on its own platforms. This has been documented here, seen through the lens of edge cases and a small number of collection objects that the museum would rather not share or for which it would like to have a higher level of control and safeguards in place, in order to understand the importance placed on contextualisation. What does this tell us about how the museum functions? The prompts for implementing an official image policy arose from large-scale projects like 'One Collection', which is perhaps to be expected. However, smaller digital interventions proved to be catalysts for change, leading to consideration of context in digital spaces and prompting formal image policies. Projects like MIAT and ROG that promote engagement with the less well explored corners of the collection were notably important here. This again gives an insight into the understanding of contextualisation of collections among SMG staff, as this was cited in multiple interviews as being a trigger for thinking through how the collection might be perceived. Staff were confronted with their collections outside of museum systems; they were offered up collection objects rather than coming to collection

[652] 'Science Museum Object Store: Brought to Life: Exploring the History of Medicine', *The Telegraph*, 2 March 2009 <https://www.telegraph.co.uk/news/picturegalleries/uknews/4926553/Science-Museum-Object-Store-Brought-to-Life-Exploring-the-History-of-Medicine.html> [accessed 24 March 2024].

management systems and collections online with a specific object(s) in mind. Digital access, which built on SMG's existing work, became a prompt for changes in working practices.

Museums as changeable

It is important to problematise or move away from the binary of the web as ephemeral and museums as static. Both of these beliefs may be informing behaviour, and although they may be true in some respects, this binary opposition is far too simplistic. As previously discussed, museum interpretation, like many other aspects of museums, changes over time. There different time scales for the production and use of interpretation, for example interpretation that forms part of permanent galleries can be used for up to ten years.[653] There is a practice of physically keeping superseded object and gallery labels to record that interpretation, recording how those objects were understood and represented at a particular time. Old labels give insight into different communication styles and understanding of objects.[654] Object research feeds into institutional knowledge and staff at the SMG aim/claim to be continually working on object knowledge.[655] Object research is not static;[656] object interpretation is something that is continuously evolving.

Conversely, there is a perception of web technologies as changeable and ephemeral, affecting decisions and behaviours. The perceived ephemeral nature of web pages is influencing decision making. The SMG digital team, when they decided which fields would go in the share sheet of Open Graph, made the decision quickly/arbitrarily on the basis of what would then get pulled through

[653] Blythe.
[654] Blythe.
[655] Blythe.
[656] Blythe.

when sharing collection objects to other platforms, for example social media. When discussing this decision, emphasis was placed on the fact that it could be changed later. However, Pinterest processes (and indeed open graph tags more broadly,[657]) mean that data that is shared unless manually changed stays as it was shared at that time.[658] This affordance is probably so that people cannot share one thing, have people like and interact with it, only to find that the nature of that post subsequently changes. This could lead to a misrepresentation of people's interaction with it, for example. So, a decision that was made with the apparent comfort that it could be changed and updated at any time has had lasting effects. It has impacted pins created from this point and their contextualising of the information shared with them has been and will remain fixed at the point of sharing (if the user who is doing the sharing chooses to keep it). This has now been in place for some time and it should be noted that, while this is a valuable insight into SMG digital team thinking and processes, some of these pins were created before the digital team as represented here were in post. Therefore, the pins and their context are products of web page decisions predating these thought processes.

Conclusions

This chapter has sought to understand how museum interpretation and contextualisation of collections was being shared through social media as images. It did this by understanding *how* the collection object museum interpretation was shared, whether museum interpretation was being shared

[657] Michal Pecánek, 'Open Graph Meta Tags: Everything You Need to Know', *SEO Blog by Ahrefs*, 2020 <https://ahrefs.com/blog/open-graph-meta-tags/> [accessed 24 March 2024].
[658] Marie Mosley, 'Using Pinterest Data Attributes and Meta Tags', *CSS-Tricks*, 2015 <https://css-tricks.com/using-pinterest-data-attributes-and-meta-tags/> [accessed 24 March 2024].

differently through the different platforms, and finally if the affordances of the platforms were informing/shaping how museum interpretation is shared.

The SMG's understanding of how its collections might appear out of context, prompted by digital tools, was explored; and how the Group thinks about contextualisation in terms of its objects was revealed through interviews. The SMG feels that it has a duty to contextualise or limit access to collections image content associated with difficult histories, and this has been formalised into image policies. These policies were prompted by large, organisation-wide projects like 'One Collection', which generated more digital images of collection objects, but also by smaller digital interventions like MIAT and ROG, which prompted staff to think about collections outside of museum collection systems.

SMG had an ethos of openness for its collections. Onward journeys were encouraged, be these through the collections sites or on to the SMG collection sites from other places. This has been built into the digital objects, which are designed to be as searchable as possible as well as to have links back to the SMG platforms embedded in them. Interviews and documents have revealed policies in the museum. Although this chapter has highlighted some that restrict content sharing, policies are generally geared towards collection sharing. The emphasis is on publishing collection images, with exceptions being written into policy but limited to a few collection examples. CC licensing has been set up to make the images as shareable as possible, and internal infrastructure and processes for publishing to collections online and through APIs suggest that collections are geared towards being shared, and then pointed back to museum platforms. There was a growing understanding of the potential flow of information, with mechanisms for onward journeys.

Actor network theory in this thesis chapter was a useful theoretical tool to articulate the actors, human and non-human, who have affected the digital

images of the SMG collection objects that are shared and contextualised through Pinterest. Non-human actors like middleware, metadata and CMSs that make up digital collection systems were built on what already existed. Older technologies and collections documentation have an impact on how a digital object would eventually be shared through social media, for example old, thin documentation that is digitised from a card index determines the context and interpretation that may be shared. Internal personnel hierarchies and structures also affect what will get shared and when, for example curators can decide what to publish, but the digital team decide what information gets included as metatags that determine what information is shared through social media. Then, on Pinterest the platform's algorithms could be seen as actors in the onward journey of shared images. Indeed, re-pinned images in the dataset have already been acted upon by the Pinterest platform, and its knowledge graph which will have been informed by user interactions with pins.

SMG collections have been shared as digital objects through Pinterest. Free text descriptive data is moving to Pinterest, and there was metadata migration from the 'Mini description' field, which was collected from the SMG's API, into the Pinterest 'Pin data note' field. The exact matches – where every character in the field perfectly matches – represented in the dataset are low, but there was a clear spectrum of data being matched. Museum interpretation moved demonstrably from SMG collections online to Pinterest when object images were shared. Contextualisation of objects also happened through other affordances of the platform, for example on Pinterest boards, through naming and recontextualisation of pinned images.

There was a particular framing of the collection object through museum interpretation, and this context could have been shared from the physical sites of the museum not just digitally. A museum collection object may have been interpreted in collections online in a way that is different from how it has been

framed in an exhibition, even in the same museum. Due to the limitations of data collection and processing of Twitter data at the time of collection, information about onwards journey image prompts was not included in the dataset. The data did, however, show interpretation sharing in relation to exhibition design captured in digital images and shared through social media. Object interpretation has still been framed in exhibition/display design, but this was a conscious choice and an important part of the shared image.

This chapter also introduced the idea of the museum as changeable rather than fixed, and conversely, of the web as more fixed than might have been assumed. Although digital may be perceived as ephemeral, sharing through social media actually created fixed moments of context for those objects. There was potential for what had been shared as part of the digital object to be outdated museum interpretation. What was shared was a moment in time for the museum, but metadata or the interpretation of that object in an exhibition can move on. However, sharing has meant that a point in time when an object was contextualised and interpreted has been captured, and potentially this will then used to contextualise that object in a new space. For example, many of the pins shared through Pinterest were from Brought to Life, an early and subsequently decommissioned SMG collections site. Through Twitter, a number of objects shared with their interpretation as part of Top Secret were contextualised specifically in relation to that exhibition. The interpretation therefore will have reflected that part of the object's biography, which was one part of a larger story.

Object biography has been used to understand a part of the metadata that has been shared with the collection object. This was shown to have migrated from the SMG metadata mini description to the pin description metadata on the Pinterest platform. Therefore, building on those who have conceptualised the value of object biography for digital collection objects, the information becomes

a source of transferrable value and, through the object biography lens, commodifiable.

Whether or not an object is singularised becomes less clear cut when it is collection object representations that have been circulated. If collections are data, and data is humans, then who has profited when data has been reused? Business models for social media, where it is free to join, mean that a person's interactions with the platform and the data that these produce generate income. Collection objects perhaps have been shared because of their singularised status as part of the museum collection, and they then have a digital referent made of them, also by the museum. When the born digital object referent (framed here as the image and interpretative information of the collection object) have been shared through social media, it moves back into the sphere of commodity through its incorporation into a social media website. As a newly born digital object, it will have still been in reference to both the museum digital surrogate and the material cultural artefact that it documented. Therefore, this latest born object existed in reference to another object's biography but it has also created an object biography of its own, as suggested by Zuanni, through user interactions. It now exists in the sphere of commodity as data.

Chapter 6 – Collections as networked images: final conclusions

This thesis sought to understand how digital images of SMG collection objects have been shared and recontextualised through social media, and specifically through the Twitter and Pinterest platforms. It explored whether this sharing expanded upon and/or provided new understandings of the objects, which types of images of objects have been shared over time, and finally, in what form(s) those digital images were shared.

The SMG collection is made up of objects held across several sites and museums, but it is conceptualised as a single entity. The collection was therefore approached and understood as a whole in this thesis. As previously introduced the SMG sites can be found throughout Britain: there are rail-focused sites in Shildon (Locomotion) and the National Railway Museum in York; there is the Science and Industry Museum in Manchester, as well as the National Science and Media Museum in Bradford; and finally, there is the Science Museum in London. Additionally, SMG has a collection storage facility: the National Collections Centre, Wroughton, Wiltshire. However, when data collection for this research started SMG still had collections in storage at Blythe House, London, and a large-scale collections move and digitisation programme was underway entitled 'One Collection'. The SMG collection is online and can be accessed digitally through a single website.

This thesis is built on Dewdney and Sluis' idea of the networked image, and the digital images of SMG collection objects have been considered using this. Digital is embedded within people's lives, rather than existing in an oppositional binary to their existence: it is a product of both cultural expression and

technology.[659] Networked images have many connections, as noted earlier in the thesis: '[a] networked image emerges through the network; its existence is intrinsically entangled and intertwined with software, hardware, code, programmers, platforms, and users'.[660] This thesis explored the connections of digital images of the SMG collections, as well as the networks that they exist within. Informed by the specific platform affordances of Twitter and Pinterest it analysed how the digital collection images have existed as part of the Group's image ecosystem (the digital infrastructure within which the images sit at the SMG), how that infrastructure is built on collection systems that have themselves evolved over time, how hierarchies of people and distributed ways of working have affected image creation and publication, how images of the SMG collection have existed in relation to a collection of which they are not part, how these images have been shared, how they reflect a person's reaction to a particular collection object or have been amplified on to other networks by someone else's reaction, and more.

A key question was that of the form in which the collection images were shared as digital objects. Ross Parry argued in 2013 that museums were post-digital.[661] Suess stipulated that the journey to posting from a gallery visit happens in both physical and digital spaces.[662] A seamlessness between digital and physical spaces has been shown, rather than there being a dichotomy between material and digital.[663] The digital images in this research have been broadly categorised into two main forms, but both find themselves in relation to the material and the digital. Two types of digital images of collection objects were identified that reflect different kinds of encounter with the collection. The first type are images taken by those encountering the SMG collections in person and

[659] Dewdney and Sluis, p. 7.
[660] Dewdney and Sluis, p. 5.
[661] Parry, 'The End of the Beginning'.
[662] Suess.
[663] *Digital Materialities: Design and Anthropology*, ed. by Sarah Pink, Elisenda Ardèvol, and Dèbora Lanzeni, 1st edition (Routledge, 2016), pp. 6–8.

sharing these through social media. They might be sharing the act of looking, where the audience join the photographer in looking at the collection, or the image might be a form of self-representation, where the photographer documents their encounter with the collection object, for example in the form of a selfie. The other form in which digital images of the SMG collection were shared is that of already digitised images of the objects created by the Group and published online. These were encountered digitally and shared digitally. The act of sharing might have involved some intervention in the image, for example digital editing and/or incorporation into another image as part of a meme. These two types of digital images embody the different kinds of encounter that visitors and users are having with the SMG collections, framed in this thesis as physical-to-digital and digital-to-digital image sharing. These different types of images and encounters have been addressed through six chapters. It began with an introduction and literature review (Chapter 1), followed by a detailed description of the digital humanities methods used and ethical considerations (Chapter 2). Chapter 3 considered SMG collections encountered in physical settings, for example in-gallery, which were then photographed and shared on social media, and explored this physical-to-digital sharing. Chapter 4 was concerned with SMG collection images encountered digitally and shared through social media and explored this digital-to-digital sharing of collection objects. Chapter 5 was concerned with the automation of context and how digital infrastructures facilitate the sharing of museum interpretation through shared digital images. It adopted a case study methodology to explore this question in depth. Finally, thesis conclusions are outlined in this chapter.

There was significant variation in the types of images of collection objects that were shared. The objects that were found in the dataset created for this thesis represented an extensive number of different categories of collection object. While these categories did not represent the entirety of the Group's collection, they did showcase its breadth. The different platforms for sharing and the different nature of the encounters with the collections object were reflected

in the categories of object or areas of the collection more likely to be shared in a particular channel. On Twitter, which was the main site of study for understanding physical encounters with the collection, the most likely area of the collection to be encountered was rail. This might have been because there is an engaged online rail community, as seen through interactions with curators, who themselves participated in this activity. It might also be that the objects that form part of this collection – trains, locomotives and other rolling stock – are moveable, and when encountered outside of the sites of the museum, people wanted to share this with the SMG through an open accessible medium where they could have an informal conversation, sharing that they have seen a famous collection object outside of the sites of the museum. It might also have been that trains and locomotives are large imposing objects, and therefore visitors wanted to share this physically imposing encounter through social media. This is different from the objects that were frequently shared through Pinterest. The types of digital images of collections shared on Pinterest were most likely to be those that were encountered digitally and then reshared digitally (this can also happen on Twitter, but it was more likely to happen through Pinterest). In contrast to the physical encounters shared through Twitter, Pinterest and collections photography as a reproductive medium enables close-up photography of smaller, more-detailed collection objects. This is evident from the kinds of collection object images that were shared through Pinterest. Medical and anatomical collections objects were the most likely to be shared through Pinterest. Potentially these collection objects have higher rates of sharing in the Pinterest dataset because of the legacy of the Brought to Life website, a pioneering online collaboration between the SMG and the Wellcome Collection that has now been decommissioned. This example is a good illustration of the legacy and afterlife of shared collection images and associated information, which can persist in other contexts and on other platforms long after the collections website that originally hosted them has ceased to exist.

This thesis sought to understand if sharing these digital images of collection objects expanded on or provided any new understandings of the objects. The original hypothesis was that sharing images in this way would give people the opportunity to personally reframe them, but the affordances of the platforms used for sharing meant that there was more space for personal reactions and recontextualisation, rather than for extensive reframing of the object in a new critical understanding. If this research was looking at SMG collections shared through a non-social media platform like Wikipedia, there could be greater scope for critical reframing of the collection objects. However, the ability for people to recategorise images through Twitter and especially Pinterest should not be undervalued. Museum collections have been created with a specific purpose in mind, and objects are collected to exemplify something in the museum.[664] Social media gives objects a life beyond the museum categories that they were collected to represent, and they can come to mean more than just the categories assigned to them in the museum. Additionally, people are not the only actors recategorising objects, knowledge graphs can recontextualise the collection. For example, on Pinterest, when an object is pinned and reshared, it is categorised and recontextualised by the platform's algorithm; the content is tagged in a new way and re-shared to users who might be interested in images related to that topic.

A digital surrogate is a very different digital object to the networked image. The digital surrogate is an authoritative digital file, siloed in the museum collections infrastructure, where it exists in reference to the collections object but is not the collections object image in circulation. The networked image that depicts an SMG collections object may have at one time have a digital surrogate, but it became a more open digital object. The networked image is made up of the many connections, recontextualisations and interpretations that it exists within and in reference to. Rather than being a siloed static object, it exists in a state of

[664] Weilenmann, Hillman, and Jungselius, p. 1851.

flux and potential, a copy open to recontextualisation. This raises questions about what it means to be an authoritative source when in this state of flux. History as a discipline is an ongoing reinterpretation of sources, therefore even digital surrogates exist in this state of potential for reinterpretation. However, it is the networked image of a collection object that can transcend its status as a copy to be recontextualised, given a new lease of life as a digital object, while still referring back to the digital surrogate.

Thesis subject contribution

This research exists at the intersection of three distinct but related disciplines: design history, museum studies and digital humanities. It has contributed to all three but has also made a distinct interdisciplinary contribution.

Contributions to Digital Humanities

Digital humanities encourages scalable reading approaches, moving between the micro and macro levels, as well as qualitative and quantitative, in order to explore and understand complex humanities data. This research has demonstrated the value of these methods for working with digital images as well as text. When working qualitatively with a social media platform, it is important to take an ethnographic approach in order to rigorously critique the content on it. Content is in a state of constant change, as social media spaces are not only time but platform and community specific. Approaching social media platforms in this way enables appropriate framing of sources and the application of contextual integrity. It is not possible to properly apply the use of contextual integrity without knowing the informational norms of the platform of study.

It is not only qualitative methodologies that are subject to change. Platforms are commercial services that continually evolve, and changes in ownership can mean that access points such as APIs and analytics dashboards, from which data can be retrieved at scale, are subject to change or even removal. This has meant that methods outlined in this thesis have become unable to be replicated. Since this PhD started both Twitter and Pinterest changed ownership: there is now no longer an accessible Pinterest API builder; Twitter is no longer called Twitter and its API is no longer accessible to researchers. When working with sources from online platforms, therefore, it needs to expected and planned for that such changes may occur without warning. Consequently, for digital humanities it is important not just to learn how to use a particular tool or interface, but to understand key methods, such as how to make API calls, and crucially how to adapt them. These methods can then be used for different spaces and on different platforms that remain relevant to future research. Continual change of online digital platforms is not only limited to social media, SMG collections sites have also changed, for example the decommissioning of Brought to Life and alterations to the collections online URL happened during the course of this research. The documentation of these changes, and openness about their impact on research projects, is an important output of this study.

Anticipating and mitigating digital ephemerality is more pronounced in social media research then in digital humanities more broadly. The potential for change of the platforms that were the focus of study meant that, in this thesis, the researcher needed to be engaged beyond changes in content, considering those in the user interface, functionality or analytics. Methods used to mitigate these have been discussed in detail Chapter two. They included manual collection of analytics fields that were previously automated, collection of soon-to-be-legacy user interfaces through tools like Conifer and the taking of screenshots, and keeping abreast of changes in platform ownership. While it was important to have been aware of these changes, they were not the focus of the research, rather a hurdle that any social media researcher should expect to face. Platform changes

should be anticipated in planning methods and ethical approval. Therefore, a key contribution to digital humanities research into social media is an assumed need for adaptability and an awareness of this when planning methods. Another method planning contribution has been rigorous research data management: the importance of regular collection, backing up and extensive real-time documentation of data.

One of the main contributions of this thesis is its focus on method and practice. The value of knowing through doing is an important take away. It was through making API calls, through having to write code and get hands-on experience with the digital objects that the collections images were contained within, that the researcher got a better understanding of what is involved in the processes of sharing. Having a practical understanding of how things are created and operate allows for a much more effective critique of processes then coming to them as an outsider. This also allows for an understanding of the actors, both human and infrastructural, that play a part in and impact how images of collections are getting shared through social media. Actor network theory has been a useful theoretical lens through which to articulate and comprehend this. In depth knowledge sits with those who built the infrastructures, but having a basic working knowledge whilst being embedded in the SMG as a collaborative doctoral partnership (CDP) student, meant that the researcher could ask relevant questions and build pipelines to scrape and critique sources. Approaching this work from more of a practitioner perspective allowed for the asking of different and more interesting questions to be asked.

Contributions to Design History

Design history literature has been used to frame digital images as an accessible technology of use for collection reproduction. This thesis discussed what it meant for photography to be used as a technology of collection reproduction and,

moreover, what it meant for a photograph to be a collection object copy. The work of Hindmarsh aligns itself with the idea that the best surrogate is one that can best replicate the original using new or emerging technologies. However, what if attention was paid to what technology had been widely adopted and used, rather than what was currently the most innovative method for making reproductions? Photography has been a medium of collection reproduction since the nineteenth century, and digital images have been used to represent collections online since they began in the 1990s. This proliferation of their use is not only by the SMG, as this thesis has shown, or even by museums more broadly. Digital cameras and mobile phones with inbuilt digital cameras have enabled this to be a technology owned by and on-hand to a large of proportion of the population. Therefore, the lens of design history has been used to understand digital images as an accessible and ubiquitous technology of reproduction for collection objects. It is a technology of use so wide and expected as to ironically become "invisible." It should be noted as *the* point of entry into visual forms of collection reproduction.

The sharing of collections is not only visual; the narrative that accompanies an object is important to its being enjoyed and shared. Through an analysis of what has been shared, even with in-person encounters, there does not necessarily need to be an encounter with the *original* object. For example, the Science Museum's Apollo 11 lander exhibit is a reproduction. This was one of the more popular big-ticket objects shared through Twitter as part of the physical-to-digital collection, even though it is not the original object. This would indicate that the most important reason for its being shared through Twitter – in fact, the most important thing to share – is the narrative accompanying this piece and indeed other collection objects. What is being shared here is the story of that object, through a visual medium, with visual elements.

Object biography is an established theory in design history. Here its use has allowed for consideration of the nature of what might be being commodified

when the digital object is recontextualised within a social media platform's knowledge graph. It provides a tool for those who study material culture to approach history through individual objects, beginning with their life histories or biographies. Zuanni's work asserts that user interaction and engagement with the digital object form part of the object biography.[665] This thesis suggests, through case study research in Chapter 5, that the digital object is a vehicle for *a version* of the object biography. That has been defined here as object description and research by the museum into the object's history, which can be pulled through as meta data in the digital object. There are limitations to this use of theory. As previously outlined in Chapter 5 it is not an exact fit with museum interpretation, and as mentioned in the introduction there are critiques of how its use could continue or obscure abuses of power. However, understanding the potential for the impact of collections research and description in an age of datafication could lead to an awareness of the legacy beyond digital image of what is shared as part of the digital object. This thesis's contribution has been to articulate how previously singularised (out of the sphere of commodity) object biography can be commodified as platform data, through its transmission to the social media platform and further user interactions with the digital object there.

Contributions to Museum studies

Performative memory making has taken place through sharing museum collections. Although there were collection objects that came up repeatedly, there were also objects that appeared infrequently. Shared images might, perhaps, depict a moment with the collection objects not necessarily on display, for example in storage, or included in more inaccessible displays in the museum. These moments shared through social media seemed to be about the ephemerality of the physical encounters. If the Twitter user did not take that picture, did not document that momentary encounter with the collection object,

[665] Zuanni, p. 705.

it would be fleeting and lost. If not shared, that encounter, reaction and documentation would only have been experienced by them.

A collection encounter requires only the collection, not the museum sites. In the field of museum studies, this research builds on the work of Suess to further explore the role that encounter plays in the sharing of museum collection objects, and how it features in the act of subsequently sharing the image through social media. This thesis draws on Seuss, but diverges from earlier ideas about the process of sharing in two important ways. The first is through physical encounters with the collection, but specifically encountering collection objects *outside* of the sites of the museum. A unique aspect of the SMG rail collections is that they can move around the country and be encountered in publicly accessible places. In an encounter of this kind a different form of experiential sharing becomes possible because social media channels allow the public to talk directly with the Group (or rather its staff) and because handles and hashtags act as qualifiers for data collection. People whose actions are represented in the dataset have shared with the museum their physical off-site encounters with collections objects, in places where they would not normally happen. These digital images represent a collection encounter; they do not result from a site visit.

This raises the question of what to call those who experience, encounter or see the SMG collection outside of the sites and platforms of the museum. It has been difficult to describe them throughout the thesis. It does not make sense to call everyone a visitor if they encounter the collection outside of the sites of the SMG, for example coming across a collection object in a railway station. Similarly, the term user does not fit everyone either. There needs to be another word or term for people who are encountering the collection outside of the spaces of the SMG, whether digitally, for example on Pinterest, or physically, for example running into the Flying Scotsman in a railway station.

The perceived beauty of an image both does and does not impact how widely it is then shared. There are some images shared within the dataset that were intended to be beautiful and eye catching, for example the original artworks that tap into nostalgia and would go on to form advertising campaigns for the railways. These have been shared through both Twitter and Pinterest, and notably on Twitter there were some of the most widely shared of the already-digitised images circulated through the platform. Their impact has been as digitised collection images, encountered digitally and reshared through social media. However, the sharing of images is not solely based on their aesthetic quality. The *story* of the collection object, which is shared and embodied through an image, is just as important. As noted earlier in this thesis, there was a fear that the collection was not as aesthetically pleasing as other museum collections, and therefore would not be so widely shared. The data collected for this thesis has shown that this is not the case, especially through the physical to digital sharing. A collection object does not have to be beautiful to be shared, rather users can share its story, for a good example of this are the objects shared from the Top Secret exhibition in Chapter 5 - Automating context: how digital infrastructures facilitate the sharing of museum interpretation through shared digital images . The narrative that the collection object embodies is what people are keen to share. This will likely come as no surprise to museum professionals. Social media, enabled text and image, makes for a visual medium through which to share these narratives.

The size of collection object shared is dependent on both the type of encounter and the affordances of the platform. On Twitter there was sharing of physically imposing, large objects, reflected by the presence of ‘big ticket objects’ in the data. These frequently shared objects included locomotives, large statues and space craft, led to physically imposing collection object encounters, which were then translated into digital images and shared through Twitter. By contrast, what was shared through the Pinterest platform were smaller collection objects where SMG digital photography highlighted the detail. Those who

encountered the collection digitally joined the museum in the act of looking at it, through these shared collection image object details. The affordances of Pinterest as an image first platform, meant that these details were easily encountered and reshared.

SMG image policies provide an insight into what the museum considered important when providing context for its own collections. When this is considered here with collection objects that have been circulating through Pinterest for almost a decade, it is possible to see the changes in collection policies over time. Museum practice changes and evolves, and this has been reflected in the images that have been made available online and how they have been framed. The Sioux amulet example in Chapter 5 shows a digital footprint that can survive despite changes in Wellcome Collection and SMG collection object reproduction policies. Museum practices are constantly changing, and the legacy of past approaches can still be seen circulating through social media long after they have ceased in the museum.

Interdisciplinary contributions

When physical encounters with collection objects are captured and shared as digital images, that person is joined by the audience in the act of looking at the collection. This thesis created a dataset of physical encounters, thus enabling an understanding of how people have looked at and have framed the SMG's collection. With physical-to-digital encounters it is more likely that people will have shared their act of looking, rather than share themselves physically present with an object (for example with a selfie). Extrapolating from that, people want most to communicate with SMG channels what they are seeing when they look at the SMG collection. They want to communicate their reaction to an object, which then becomes a shared rection to a collection object.

Some of the findings that have emerged from this thesis lie at the intersection of design history and digital humanities. As noted already from the literature by Elizabeth Edwards and Ella Ravilious, collection photography is *of* the collection rather than being considered *part* of the collection.[666] This thesis has extended this line of thought to the digital objects' relationship to the collection, and even to the collection photography. Studying networked images of collections photography has shown that these exist in connection to the museum's digital surrogate, whilst also proliferating through online platforms. Using the networked image framing for Pinterest, the collection object still references back to the digital surrogate on the SMG platforms. This image of the collection object, while still connected to the surrogate, has been recontextualised and even encountered and reshared on the Pinterest platform. Thus, it has its own journey and life as a digital object. The networked image concept allows for digital image journeys that acknowledge new platforms and interactions with an image, while still recognising its links back to museum platforms.

One of the contributions of this thesis is to the emerging use of computational methods for data-driven research in museum studies. Not only does this research take a quantitative approach to understanding what collection items were shared, but it looked in depth at the digital object they were shared in. This was only possible with knowledge sharing from digital museum professionals to understand their processes and source data. Digital humanities have a lot to offer to critically work at scale with large volumes of collection or social media source material. That could include building a robust and ethical data pipeline, but it could also mean more traditional humanities methods like source contextualization. This research has combined qualitative and the quantitative methods and taken a more computationally intensive research approach than is common in the field. As museums are already "post-digital", being able to

[666] Edwards and Ravilious, 'Museum Cultures of Photography: An Introduction', p. 2.

critically work with this large body of source material will be crucial for museum studies going forward.

Policy recommendations

This thesis was undertaken as part of a collaborative doctoral partnership programme, which offers a unique opportunity to gain insights into the practice of the cultural heritage partner. It enabled the researcher to develop policy recommendations from the research findings discussed above. These grew out of reflections based on the data findings in this research, but also from insights gained into professional museum practice. While they address the Science Museum Group as the museum partner for this research, they have scope to be applicable to other heritage organisations that have online collections.

Organisational outlook needs to shift from digital ephemerality to digital legacy. Sharing of collections is framed in this thesis as being inclusive of meta data and a representation, here it is digital images but could be other technologies such as photogrammetry. The Sixous amulet is an example for understanding that adjusting away from a digital ephemerality assumption, or the ability to edit, would benefit museum collections representation, and prompt mindfulness for when best practice in museums changes. The amulet predates SMG's policies on sharing images that contain human remains, but it now cannot be edited by SMG but it is associated with SMG through a URL.

Mechanisms for sharing digitised collection items online impact how the collection then gets represented. The digital object is more than just its image it is also its meta data: this can mean data fields like object description, but it can also be meta tags in the form of HTML. There are lots of ways in which a digital object can be acted upon when being shared online, but there are also

controllable sharing mechanisms, for example metatags. This thesis has shown thoughtful construction of digital objects is already taking place at SMG. As outlined in chapter five, there are human and non-human platform actors that impact how collection objects are shared. What is possible to share as part of an object, and how it gets shared, is influenced by platforms. However, it is museums that first get to construct the digital object on their platforms. Therefore, the digital object - its meta data and meta tags - are also a site of curation. A different form of curation that expects sharing and recontextualisation, includes links to authoritative sources, and celebrates the flexible format of the networked digital collection object.

Limitations of thesis

If this thesis was to be undertaken again, starting in 2024, the framing of the collection would have been different. A lot of thought was put into what to include and not include in the collection as understood here. Collection objects that were on long-term loan were included, for example medical and ethnographic items on loan from the Wellcome Collection that formed the basis of online sites like Brought to Life. So too were objects that have been installed in the permanent gallery spaces and sites like Apollo 10, which is on loan from the Smithsonian Institution but became one of the 'big ticket objects'. However, temporary exhibitions that included no collection objects were not included in the study. This distinction of what is and is not included in the collection was not obvious to online or on site visitors. Therefore, if this thesis was to be undertaken again, it would be more inclusive in its definition of the Group's collection objects.

The focus of this thesis was on the 'how' rather than the 'why' of SMG collection object recontextualisation, therefore a limitation of this thesis was its lack of research on users' and museum visitors' perspectives. The focus on 'how' led to research on the digital object which included use of computational

methods that did not centre user behaviour. Different methods could have been employed to understand why users shared collection objects through social media, such as qualitative interviews or in-depth study of specific user accounts. It was not within the scope of this thesis to study the user perspective, but it is acknowledged as a limitation of the research and a possible focus for future work.

Areas for future research

This thesis has pointed to further research in a number of areas. The first involves further qualitative research with museum professionals, to explore how roles that would not be categorised as digital within internal museum structures, have utilised and been influenced by digital practices. For example, it would be potentially fruitful to talk to curators with both large and small social media followings to see how they are communicating directly with people about their museum practice and subject specific knowledge and research. Further research on their direct communication with their networks would extend some of the research findings here. This thesis has shown that digital tools can also be catalysts for reflection on existing museum practice, therefore more qualitative research into how digital tools and interventions, however small, have caused reflection on collection practice in museums could be enlightening.

Additional digital humanities methods could be used to understand what objects have been shared from the museum, based on how easy that area is to access in the museum. A heat map, perhaps using GIS technologies to understand the frequency with which item(s) or object(s) are being shared and the ease of access for visitors to museum sites, could add depth to the work with physical encounters that has been presented here. Is there a corelation between visitor footfall and object shares? How many objects are shared on first and second floors compared with the ground floors, for example? This could be an

additional layer of understanding for curated Instagram moments, and physically imposing collection objects that have been shared through Instagram. Equally, extending the research undertaken in this thesis to other image based social media platforms such as Instagram, or indeed looking at how collections have been digitised through other forms of media capture like videos on platforms like TikTok would lead to a deeper understanding of how SMG collections have been digitised and encountered by museum visitors and users.

Generative AI and impact on images

In recent times generative AI has had a large impact on images shared through social media. The landscape is completely different at the time of writing in 2023 from when the data collection occurred for this thesis in 2019. The presence of images generated through easily accessed AI models has been felt particularly in the last 12 months, making this thesis a snapshot of an era that no longer exists. Generative AI creates new content, based on the dataset on which it was trained.[667] Generative AI models for images include, DALL·E, Midjourney and Stable Diffusion.[668] In reaction to this, tools like Nightshade, a 'data poisoning tool', have been developed to corrupt generative AI models and prevent them from being trained on scraped images against an artist's wishes or without their knowledge.[669] The ease of editing photos has also increased. Although it was possible to edit images with proprietary software such as Photoshop at the time of data collection, it did not include features like "generative fill" where users can

[667] 'Explained: Generative AI', *MIT News | Massachusetts Institute of Technology*, 2023 <https://news.mit.edu/2023/explained-generative-ai-1109> [accessed 8 December 2023].
[668] 'Explained'.
[669] 'This New Data Poisoning Tool Lets Artists Fight Back against Generative AI', *MIT Technology Review*, 2023 <https://www.technologyreview.com/2023/10/23/1082189/data-poisoning-artists-fight-generative-ai/> [accessed 8 December 2023].

‘[a]dd, remove, or expand content in images into their existing images’ using text prompts.[670] Even digital images quickly taken on people’s phones can be much more easily edited and manipulated using tools that erase selected parts of the images.[671] This evolution in photography and our understanding of how it was made and by whom means that questions of reuse have also evolved.

Figure 85 – Screenshot showing quote tweet featuring a porcelain tureen in the shape of a crab on a plate, from Peabody Essex Museum Collection, image commented upon by academic Sluis. [Accessed 8 December 2023]. The image cited here has been redacted to prevent copyright infringement.

[670] ‘Generative Fill - Online & Desktop - Adobe Photoshop’ <https://www.adobe.com/uk/products/photoshop/generative-fill.html> [accessed 8 December 2023].
[671] ‘Magic Eraser plus More Google Photos Features Coming to Google One’, *Google*, 2023 <https://blog.google/products/photos/magic-eraser-android-ios-google-one/> [accessed 8 December 2023].

Generative AI is changing the function of photography as a technology of collection reproduction. As discussed earlier, photography has long been a technology of collections reproduction. However, the tweet in Figure 85 by Katrina Sluis, key in this thesis for her work on networked images, illustrates the now changed relationship specifically between users and shared images of museum collections. They are now shared and exist in a landscape where generative AI is easily accessible. The novelty of interesting objects from museum collections, reproduced through photography and shared through social media, can no longer be believed simply through the existence of a photo, as may have been the case in 2019.

In the final year of this thesis, the huge growth of interest in generative AI, and particularly ChatGPT, has transformed digital and cultural heritage research. There needs to be further research into generative AI and the importance of credible sources. The networked image enables recontextualisation but with authoritative content links. This thesis has shown that collections photography and interpretation by museums is not finite, and like the digital spaces through which it has been interpreted, has also been in a state of flux. Collection photography as a method of collections reproduction does have this element of ephemerality to it when combined with digital. Therefore, moving into a time where deeper questioning of sources is required because of generative AI, more research needs to be done into what makes for an authoritative source when encountered digitally outside of the platforms of the museum. Does it still exist in reference to the collection object held by the Museum or is it something else entirely now. Does it exist as a digital object in its own right? In the new context of generative AI images these questions could be further explored.

Institutional Reference No:
SASREC_1920-447-PhD

Appendices

Appendix 1 – Interview participant consent and information form

Participation Information Sheet and Participation Consent Form

1. Participation Information Sheet

A description of the Research project and which institution it is being hosted.
Digitised collections and the social museum: the (re)use of images of objects in the collections of the Science Museum Group *School of Advanced Study, University of London / Science Museum Group* Museums are moving decisively away from viewing visitors as passive consumers of content to seeing them as active participants in the creation of knowledge. This project will explore what that means for museums and their audiences in digital spaces, focusing on the (re)use online of images from the Science Museum Group collections. It will investigate how and why museum visitors share photographs of objects taken in-gallery, as well as the factors that motivate them to engage with digitised images made available through the Science Museum Group online collection, thereby gaining insight into the role of the digital in the development of the social museum.
A description of what will be required of the participants (include details of amount of time required of participants)
Half an hour of your time for an audio recorded interview, either in person or via Skype (or similar video call service).
A statement which addresses confidentiality and security of information.

Details of who will have access to personal information and the purpose(s) for which participant information will be used, including whether participants would be potentially identifiable in any published material
Your information will be processed in line with GDPR regulations. If you are happy to have quotes attributed to you - these will be included in the research. If you would not like to be named by either your given name or job title, or have quotes attributed to you, or even included in the study, sources will either be anonymised or withdrawn from the study as requested.
A statement that participation in the research is completely voluntary, that participants are at liberty to withdraw at any time without prejudice or negative consequences, that non-participation will not affect an individual's rights/access to other services/care (e.g. in the case of patients)
Participation in the research is completely voluntary. You are at liberty to withdraw at any time without prejudice or negative consequences.
A statement about any potential risks, harms and benefits to participants
N/a
The contact details of the investigators (and supervisor where the principal investigator is a student) should the participant require further information
Rhiannon Lewis - Principal investigator School of Advanced Study & Science Museum Group rhiannon.lewis@postgrad.sas.ac.uk **Professor Jane Winters -** Supervisor

School of Advanced Study, University of London jane.winters@sas.ac.uk   **John Stack -** Supervisor Science Museum Group john.stack@sciencemuseum.ac.uk
For any contact at Institutional level, please address your correspondence to **Research Services, University of London** E: Research.ethics@sas.ac.uk Tel: 0207 862 8825 | Fax: 0207 862 8657 All policies and procedures are available here: https://www.sas.ac.uk/research/research-office/research-ethics
Interviewer signature and date:
Participants to the research are asked to confirm their participation as follows: I have (*please tick all*) ☐ read the information about the research/study. ☐ had an opportunity to ask questions and discuss this study ☐ received satisfactory answers to all my questions ☐ received enough information about this study ☐ been given the contact details of the researcher and the Research Services should they need further advice or information

2. Participant Consent Form

[please only ensure appropriate/relevant options]

Participants to the research are asked to confirm their participation as follows:

I (*please tick as appropriate*)

- ☐ Agree to participate in an interview in connection with research being conducted by RHIANNON LEWIS in connection with work for her PhD thesis **as explained in the Participation Information Sheet.**
- ☐ Understand that the interview will be audiotaped and that I may be identified by name.
- ☐ Understand that the interview will take up to 30 minutes
- ☐ AM free to withdraw from this study:
    a. At any time (or until such date as this will no longer be possible, which I have been told)
    b. Without giving a reason for withdrawing
    c. If intending to become a student at the University of London, the interview will not affect my future at the University.
- ☐ Understand that in the event of withdrawing from the interview, any tape made of the interview will be either given to me or destroyed, and no transcript will be made of the interview.
- ☐ Understand that, upon completion of the interview, the tape and information content of the interview may be used as follows (please your preferred option(s) by ticking the box(es)):
    - ☐ Material may be quoted in the research papers and PhD thesis of RHIANNON LEWIS, and attributed to me.
    - ☐ Material from this interview may be quoted in the research papers and RHIANNON LEWIS, but I wish to remain anonymous.
    - ☐ My comments are confidential, for the information of RHIANNON LEWIS in the writing of her PhD thesis only and may not be quoted.
    - ☐ I would like to receive a printed copy of the interview transcripts
- ☐ May request that portions of the interview be edited out of the final copy of the transcript.

- Understand that at the conclusion of this particular study, the tape and transcript of the interview will be kept in the Science Museum Group & School of Advanced Study and that the completed PhD thesis will be kept for public use by the University of London

Signed (participant)	Consent Date
Name in block letters	
Signed (parent / guardian / other) (if under 18)	Consent Date
Name in block letters	
Address or Contact Details:	

All signed consent forms will be stored securely by the researcher.

PRIVACY NOTICE

The University's researchers collect data as part of a formal academic research project. This is governed by the University's academic policies and procedures and our Research Ethics committee. The Research Participant Consent Form above should explain to you fully what will happen to your data. Please contact your researcher if you are unsure about anything.

There are broadly two types of data that will collect during the project:

- *data collected in interviews or surveys and used in the research*
- *contact details and relevant forms used to manage the research project*

Our legal basis for processing your data is necessary for a task carried out in the public interest, in this case the academic research carried out by the University. Where we collect special category data, such as that related to your ethnicity,

health, sexual life, political allegiance or religious belief then our legal basis is where this is necessary for research purposes.

After the research project has been completed the data may be retained and re-used. In some cases it will be added to a data repository for use by other researchers. We, and other academic bodies, are required by law to put in place adequate safeguards to protect your data and your identity (e.g. by anonymising the data or replacing names with other identifiers).

Unless otherwise stated, the University of London is the data controller for the data collected in research projects. We are subject to the General Data Protection Regulation (GDPR) and UK Data Protection Act 2018. You can find out more about data protection at the University, including the contact details the University's data protection officer on the University's website (simply put 'data protection' into the search box or go to the following link: https://london.ac.uk/about-us/how-university-run/policies/data-protection).

For any contact at Institutional level, please address your correspondence to

Research Services, University of London

E: Research.ethics@sas.ac.uk

Tel: 0207 862 8825 | Fax: 0207 862 8657

Appendix 2 - Pinterest API Python Script run on Jupyter Notebook

Script to collect JSON data from Pinterest's API.

This was run on a localhost to keep it private.

Before running this script needed to have:

- generated an access token from Pinterest, insert this.
- made list of PinID. The pinids.txt file should contain a list of pin ids, one per line. (In this case collected from Pinterest business analytics over 6 months, this file needs to be ready before running the script.)

The below Python code would be spilt into cells in Jupyter Notebook, i.e. 'in [1]' is cell 1.
The wait time is 1 hour (3,600 seconds)
All JSON files will be saved into the ./json subdirectory

```
In [1]:  import os
         import requests
         import time
         from datetime import datetime


In [2]:  # Change this to your own access token
         accesstoken = '#[insert access token]#'
```

```
                # This is the wait time, in seconds, used when you hit the API
                limit.
                waittime = 3600

In [3]:  # This loads the pin ids into a list
                pinidlist = open('pinids.txt').readlines()
                pinidlist = [u.rstrip('\n').strip() for u in pinidlist]

In [4]:  def scrapeJson(pinid):
                    '''
                        Function takes a URL and scrapes the JSON to the disk
                    '''
                     pinapiurl = 'https://api.pinterest.com/v1/pins/' + pinid +
                    '/?access_token=' + accesstoken +
                    '&fields=id%2Clink%2Cnote%2Curl%2Cattribution%2Cbo
                    ard%2Ccolor%2Ccounts%2Ccreated_at%2Cimage%2Cm
                    edia%2Cmetadata%2Coriginal_link'

                    directory = 'json'
                    if not os.path.exists(directory):
                       os.makedirs(directory)

                    # Make the filename
                    scrapefile = "./json/" + pinid + ".json"

                      # If the file does not exist or if it is too small (less than
                    100 bytes), we need to scrape the json
                    if not os.path.exists(scrapefile) or
                    os.path.getsize(scrapefile) <= 100:
```

```
            print('scraping pinid ' + pinid)

            while True:
               res = requests.get(pinapiurl)

                    if res.status_code == 429:  # If limit reached, wait,
                and try again
                  now = datetime.now()
                          current_time = now.strftime("%H:%M:%S")
                                  print("Current Time =", current_time)
                                  print('waiting ' + str(waittime) + '
                seconds...')
                  time.sleep(waittime)
                  continue

                        elif res.status_code == 200: ## If status is
                'successful' save the json
                  with open(scrapefile, "w") as f:
                     f.write(res.text)
                     f.close()
                  break

          else:
                    print('using cached json for pinid ' + pinid)
```

In [5]:
```
# Loop through the pin id list and scrape each one
for pid in pinidlist:
scrapeJson(pid)
```

```
#[output will appear here]#
```

```
In [6]:  # Merge the JSON files into a single file
         # (You only need to do this if you want to, and you can re-run
         this cell to re-merge all the individual files in the ./json
         directory)

         import json
         import glob

              result = []
         for f in glob.glob("json/*.json"):
         with open(f, "r") as infile:
         result.append(json.load(infile))

         with open("merged_pinmetadata.json", "w") as outfile:
         json.dump(result, outfile)
```

Appendix 3 – Table of categories for coding digital tweet images

These categories are discussed in Chapter 3 – physical encounters shared digitally.

Category	**Subcategory title**	**Subcategory description *(if needed)***
Collection Object Type *These differ from the collection object types used by SMG as these often relate to the reason an object was collected whereas what may first strike the sharer as its type. These include but are not limited to the object types in Pinterest.*	Aeroplane(s)	
	Analogue photograph(s)	
	Animation	
	Art	
	Book(s)	
	Camera(s)	
	Clock(s)/horology	
	Clothing	
	Computation	
	Diagram(s)	
	Drugs	
	Engine(s)	
	Ephemera	
	Figurative Sculpture(s)	
	Instrument(s)	
	Machine/machinery	
	Material sample(s)	
	Medical	
	Medicine	
	Mental Health	

	Mixed	
	Model(s)	
	Painting(s)	
	Poster(s)	
	Print(s)	
	Prosthetic(s)	
	Religious	
	Robot(s)	
	Signage	
	Slide(s)	
	Smoking	
	Space	*Objects and images relating to space exploration. (Inclusive of full-scale replicas.)*
	Telecommunication	
	Textile	
	Tool(s)	
	Toy(s)	
	Train(s)	*Trains and locomotives.*
	Vehicle(s)	*Inclusive or cars, bikes and boats.*
	Weapon(s)	
Nature of image *Through what image processes did the digital image come into being? In what format was it originally an image, or was the image taken?*	Digital amateur photo	*This is to make a distinction between professionally taken photos.*
	Digitised analogue photo	*These are photos taken using film and chemical processing that have a physical photograph that has then been digitised.*
	Digitised painting/drawing	

	Digitised Print	
	Image of 3D scan	*2D image of 3D scan, only sharing an image not the 3D scan.*
	Layout	*Sharing of print layout before it has been printed.*
	Meme	
	Multiple images in one	*Such as collage, whether physical of digitally made.*
	Professional digital photo	*This is to indicate when the photograph has been taken by a professional photographer, potentially using specific equipment like a tripod, lighting or specialist camera.*
	Screenshot	*This can be inclusive of materiality, so someone physically taking pictures of a screen or taking a screen grab.*
	Visible digital editing	
Location of collection object(s) photographed *Physical location where the image was taken both on and off the sites of the SMG.*	Blank background	
	Inside object	*Image taken of inside of the object.*
	Inside unknown	*The object is somewhere inside, cannot tell if this is or is not in SMG.*
	Mixed	*Multiple locations appear in the image (i.e., wide angle or collage).*
	N/a	*It does not have a physical location. It is shared digitally,*

		or it is a digitised analogue photograph and it is not possible to know the location of the original from the digital image.
	Offsite inside	
	Offsite outside	
	On SMG site – conservation	
	On SMG site – café	
	On SMG site – gallery/Installation shot	
	On SMG site – outside	
	On SMG site – shop	
	On SMG site – stores	*Object(s) shown in the stores or storage sites of SMG.*
	On SMG site – talk space	
	On SMG site?	*A collection object appears to be on site at SMG but not enough information to know for sure. Also not possible to know that it is offsite for sure.*
	Outside unknown	
	Photo of print media	
People in shot *Are there people in the image?*	No	
	Yes	
People in shot expanded *It has greater detail on how those people appear in the images.*	No	
	Yes	
	Yes – depicted	*There are no actual people in the image but they are depicted, for example in*

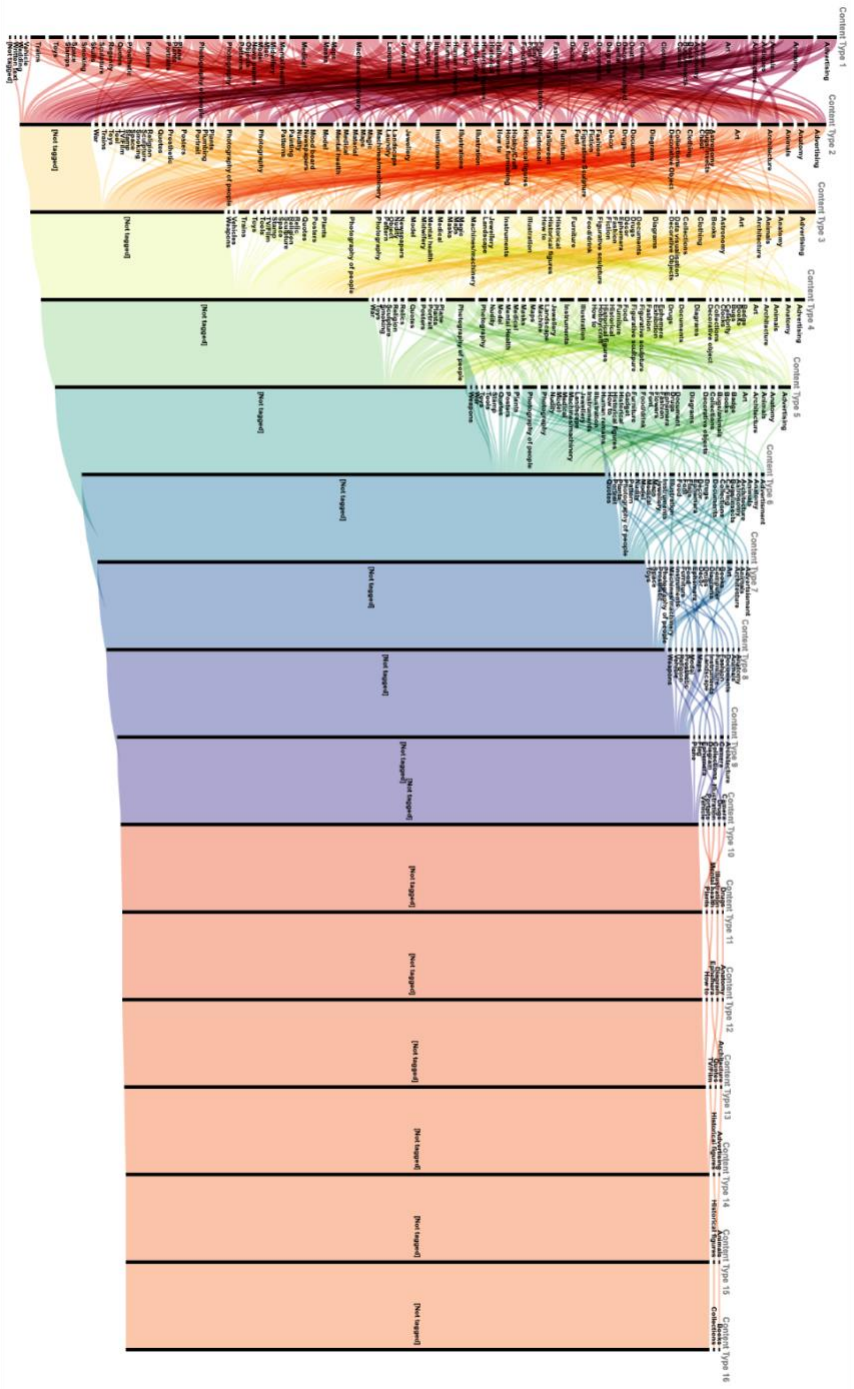
		models, cartoons or through artwork.
	Yes – group shot	
	Yes – seemingly unintended	*People are in the photograph, but it looks as though this was unintended. They are not the subject, but they are there*.
	Yes – selfie	
Object placement *How do the collection objects appear in the composition of the image, are they the focus?*	Background	
	Foreground	
	Whole frame	
Number of objects	Multiple	*Multiple SMG collection objects shown in the image*
	Singular	*Only one SMG collection object is shown in the image*.
Staging of image *This category does not describe content rather it should indicate the staging of the image and by extension the collection object*.	Advertising/marketing	
	Building/exhibition build as focus	
	Close up	
	Event	
	Existing image	*The image existed before it was a digital image that was shared through Twitter*.
	Going about business shot	*The person who is the subject of the image is photographed in the course of their day*.
	In process work of museum staff	*The image depicts SMG staff doing their work*.
	Inclusive of interpretation	*The digital image of the collection object also – visibly,*

		seemingly intentionally and importantly legibly – includes interpretative text. (If it's too small to read or cut off it is not included in this category).
	Interactive (installation)	
	Object(s) displayed backstage	*Not in the publicly accessible spaces of SMG, but also not in places like the stores.*
	Object(s) in display case	
	Object(s) in gallery	
	Object(s) in landscape	*This is where collection objects are photographed outside in the landscape, rather than in landscape format. (This is inclusive of train stations.)*
	Object(s) in storage	
	Object(s) only	
	Personal (creative) response	*Responding to the collection.*
	Posed people shot	*People are posing for the image and the collection objects happen to also be there.*
	Posing with/in	*People are posing inside or with the collection objects.*
	Screenshot	*Not solely digital. Someone taking a shot of a screen.*
	Stand(s)	*As in stands, such as market stalls.*

	Workshop/activity	*A museum-run workshop, as an activity, rather than workshop as workplace*.

Appendix 4 - Alluvial graph showing content type of Pinterest boards

Alluvial graph showing Pinterest boards by content type of board as identified by the researcher.



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