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UK Museums Online

Digital Inequality, Engagement, and Algorithmic
Mediations

Ellen Charlesworth

A thesis presented for the degree of
Doctor of Philosophy



Department of English Studies
Durham University
United Kingdom
September 2025

UK Museums Online

Ellen Charlesworth

Abstract

The Covid-19 pandemic saw rapid and wide-ranging changes to visitor behaviours and modes of engagement, with many museums' digital teams increasing their online output to meet a perceived increase in demand for content accessible from home. This thesis set out to explore the extent of such changes, charting the shift in digital engagement strategies over the past five years and the impact this has had on online audiences. In doing so, this research has created a benchmark for the sector that enables museums to make better informed decisions regarding their digital strategies. It represents the largest study of digital adoption in UK museums, pioneering new data collection techniques, and borrowing methods from computer science and the digital humanities to answer the following research questions:

1. How did museums in the UK adapt to the perceived increased demand for online experiences resulting from the outbreak of Covid-19?
2. (How) has museums' online offerings changed during the course of this research (2020–2025) and how was it received by audiences?
3. What are the main obstacles, necessary resources, and parameters of success for museums publishing online?
4. Looking to other fields, can the methods for evaluating online experiences be improved upon?

Adopting a range of methods – including statistical analysis, natural language processing, computer vision, network analysis, and interviews – the thesis provides a nuanced portrayal of UK museums online. The findings highlight the levels of digital inequality within the sector and the bias in existing literature towards larger and well-resourced organisations. In evaluating different methods of measuring engagement, it uncovered the role that ranking and recommendation algorithms play in the size and diversity of museums audiences, raising the question of whether public, charity, and cultural institutions are served well by privately owned platforms and third-party content management software.

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Understanding that the longer the acknowledgements run, the more egregious the inevitable omissions appear, I have kept this scandalously short.

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Chapter 1

Introduction

1.1 Motivations and Objectives

In 2020, the UK – like much of the world – implemented a series of restrictions on ‘non-essential’ contact and travel to combat the spread of the Covid-19 virus (Brown et al. 2021). During these ‘lockdowns’, museums closed their doors to the public, and many turned to online forms of communication as a way to connect with their audiences and surrounding communities (Crooke 2020; Noehrer et al. 2021). As the lockdowns lengthened, so too did the list of prominent museum leaders extolling the virtues of the digital transformation that the pandemic had forced upon the sector. This ‘Great Leap Forward’ or ‘digital pivot’ was an unexpected silver lining of the uncertainty and financial hardship faced by museums during this period (Heal et al. 2021; Kidd et al. 2021).

As both a museum practitioner and technology enthusiast, I was an avid visitor of the new abundance of digital experiences – from interactive websites to social media posts, and virtual galleries.¹ But despite the celebratory articles about virtual galleries (Feinstein 2020; Shehadi 2020), I was generally underwhelmed. I struggled to navigate lengthy walls of text, finicky controls, long loading screens, and links leading to 404 error pages. Poor experiences were more common than not, and I had – on multiple occasions – quit in frustration. Increasingly, I felt there was a growing disconnect between the way people talked about what museums were publishing online, and the actual user experience. What had audiences made of this experience that had so deeply frustrated me? What kind of engagement and learning was really being facilitated online?

¹The word ‘practitioner’ will be used throughout this thesis as this inclusive term more accurately reflects the broad range of roles – including voluntary positions – within the museum sector than the word ‘professional’.

This research was born of these questions. And then, promptly – as research projects are wont to do – swiftly took a number of diversions down new paths. Working with such recent history has necessitated continuous adaption, as our understanding of the pandemic, the museum sector, and digital technologies has evolved over the past four years. This work began before Twitter became X, Meta was still Facebook, and ChatGPT would not be released for another two years. Suffice to say, our online world and the conversations surrounding it have changed significantly in that time. The research questions then, were necessarily ambitious, and aimed to explore the changes to the sector charting the shift in museums’ digital strategies between 2019 and 2024. This thesis asks:

1. How did museums in the UK adapt to the perceived increased demand for online experiences resulting from the outbreak of Covid-19?
2. (How) has museums’ online offerings changed during the course of this research (2020–2025) and how was it received by audiences?
3. What are the main obstacles, necessary resources, and parameters of success for museums publishing online?
4. Looking to other fields, can the methods for evaluating online experiences be improved upon?

1.2 Scope

The resulting research represents one of the largest studies of digital adoption in the museum sector to date, pioneering new data collection techniques, and borrowing methods from computer science, the social sciences, and the digital humanities. It collates over 3,200 museum websites and – with the invaluable help of the Mapping Museums team at King’s College London – 3,250,000 tweets and 1,450,000 Facebook posts.² By using this quantity and variety of data, it aims to build a comprehensive picture of what museums have been doing online, and how this can be improved. Each of these datasets are open access and have been made available on Zenodo.³ Yet, as with any project, the finite timeline and resources available have necessitated limits on what was included in terms of

²Funded by the UK Arts and Humanities Research Council (AHRC), grant number: AH/N007042/1.

³All of these can be found on Zenodo, a data repository (OpenAIRE 2013). The final dataset of the population study will be uploaded later this year as the last of the papers are published, and linked to via my GitHub page https://ellencharlesworth.github.io/phd_thesis. This page will also host interactive versions of the visualisations within this thesis.

timespan, organisations, media, and different forms of analysis. This section will explore the scope of the work, clarifying exactly what is and is not included within this thesis.

1.2.1 The Pandemic in the UK

The focus of this research is the pandemic period. In the UK, restrictions came into force on the 26th of March 2020.⁴ This ‘first national lockdown’ was followed by a gradual easing of restrictions, with schools and non-essential shops opening in June and while indoor venues such as museums did not reopen until August (Brown et al. 2021; Institute for Government 2021). During this period, many museums conducted a phased reopening, where the number of visitors was capped, galleries were closed off, one-way systems were implemented, timed tickets were issued, and visitors were asked to wear masks (Harris 2020; Higgins 2020).

This arrangement was halted by a rise in cases in October, which resulted in the second national lockdown from the 5th of November (BBC Verify 2023). This was briefly lifted in December for the reintroduction of the tiered system, however, a third national lockdown was introduced in January (Brown et al. 2021).⁵ Museums however, did not reopen in this period. Therefore, instead of mapping fluctuating local restrictions, this will be referred to as a single second lockdown period in the rest of the thesis. These restrictions were eased in March of 2021, and many museums reopened in May, while all legal restrictions were lifted by July (Harris 2021; Visiting London Guide 2021).

To better contextualise these two years of restrictions, both 2019 and 2022 are included in each dataset. In addition to this, where available, more longitudinal data has been included to help provide both comparison and context, and I have erred towards including more data wherever possible. This is also true of the literature included in this thesis, which spans many disciplines. Within museum studies, this period is still being researched and new work is published regularly. Due to time constraints, literature published after March of 2025 has not been

⁴Notably this was weeks after restrictions were first introduced in Europe (Merkaj and Santolini 2022), and this delay would characterise the government response over the following year, despite repeated warnings that this would lead to a significantly large death toll (Gallagher 2020; Booth 2021). The decision making process, as well as apparent law-breaking by government ministers during this period was the subject of an independent public inquiry (UK Covid-19 Inquiry 2022).

⁵The easing of restrictions in December was divisive at the time, as cases had continued to rise. However, there was political pressure to enable families to reunite for Christmas (BBC 2020b; Booth 2021; BBC Verify 2023). The mounting opposition to the easing of restrictions saw the plans scrapped on the 18th of December, as a new tier was created that prohibited travel and mixing of households for a third of the population and reduced scaled back the easing of restrictions across the country (Savage et al. 2020).

included. This is especially true when looking at the immediate aftermath of the pandemic where the data is still being collated and analysed.

Both the audience numbers and first-hand accounts indicate the sector is still responding to the changes wrought by the pandemic. Visitor numbers have not recovered, and many museums closed permanently (Arts Council England and PS Research 2025; Ware 2025). Therefore, while the two lockdown periods form the focal point of this thesis, their impact on the sector is yet to be fully realised.

1.2.2 Defining a Museum

Of course, the time frame is not the only constraint evident in this thesis. Due to the variety of organisations within the cultural sector, it was necessary to define exactly what was included in the working definition of museums for this research. In doing so, I hope to pre-empt a likely confusion over the types of organisations included.

To attempt a definition for the sector has proved contentious. Definitions – including those proposed by ICOM in both 2007 and 2019 – have been criticised for being too prescriptive and excluding some museums (Fraser 2019; Noce 2019). Considering the variety in the global sector, this is unsurprising. Even within the UK, Fiona Candlin (2017) identified that the only consistency in UK museums since 1960 is that they are an ‘institution’: whether they are defined as non-profit; accessible to the public; focus on their audience or objects, all shifts over time. Over the duration of the Mapping Museum Project, Candlin and the team iteratively created their own definition, which was ‘that venues had permanent collections on display and were open to the public’ (Candlin and Larkin, 2020, 118). They chose, in line with governmental bodies in the UK, to exclude botanic gardens, monuments, zoos, and aquaria (Candlin and Larkin, 2020, 126). Libraries and archives were not included by default, but only if they meet the above criteria. The Arts Council have a list of over 1,700 accredited museums in the UK, which does highlight a commitment to audiences and certain standards of governance (Arts Council England 2018). However, the list still extends beyond the common usage ‘museum’, and many organisations listed are galleries or libraries (Arts Council England 2018).⁶

In order to best make use of existing datasets and the literature on museums in the UK – including both the resources of the Arts Council and Mapping Museum Project – I have replicated the definitions of previous studies and funding bodies.

⁶Some notable examples include the Leadhill Miner’s Library, the Linen Hall Library, and the Glasgow Women’s Library, which each combine library, archive, and museum.

The result is a particularly broad definition, that I was able to refine throughout the thesis; each round of data collection highlighted organisations that challenged these definitions. The methodology therefore outlines in detail what is included in each dataset, and the drawbacks and advantages of each choice.

1.2.3 An Online Focus

Having established the organisations of interest, and the timeline, it was the online facet of museums' digital strategies that I aimed to explore. Prior to the pandemic, there was a widespread assumption that digital technologies were best employed to enhance the on-site visitor experience (Bandelli, 1999, 21; Galani and Chalmers 2010; Meehan 2020; NEMO 2020*b*). This conception of the digital was upended by the closure of museums in March of 2020, when digital means became the only way organisations could address their audiences (NEMO 2020*b*). This thesis therefore explores digital technologies independently of the on-site visitor experience, and focuses on what museums have made available online. As such, it does not engage with the wealth of research on the use of digital installations within galleries (Ross 2014).

It also, due to time limitations and the availability of data, has focused on the most common forms of digital experience – which for the cultural sector are social media and websites. An initial scoping exercise conducted before the research began in earnest, led to the rapid realisation that only a small minority of museums had uploaded virtual experiences. The 3D virtual galleries which had so frustrated me during the lockdowns were in fact, the most technologically advanced of museums' online offerings. Requiring both specialist cameras and a high degree of expertise to create, they were often the result of collaborations with other external organisations (Derby Museums 2020). The museums who had the resources or pre-existing assets to put virtual tours and galleries online, often within weeks of restrictions being implemented, documented this experience and received significant news coverage (Euston 2020; Feinstein 2020; Shehadi 2020).

However, the costs of such ventures were beyond the means of most museums within the UK. This thesis, therefore, looks beyond these well-resourced institutions to explore what was happening in the rest of the sector.

1.2.4 Methodologies

Our current understanding of the sector is dominated by large and accredited organisations (Candlin et al. 2019). These museums make up a disproportionate

number of case studies in the literature, but simply widening participation would not address this issue. It would be impossible to summarise the breadth of approaches from the over 3,000 museums using just a small handful of examples. It is here that digital methods – and the large-scale work they enable – offer a different approach to researching museums.

By increasing the number of museums studied, it is possible to improve the variety of organisations included in our understanding of the sector. As such, it adds nuance to prevailing narratives and highlights a plethora of new digital strategies utilised by museums often excluded from previous research.

There are, however, limitations that come with the implementation of digital tools at scale. This thesis, comprised of six individual studies, contains a number of different digital techniques – ranging from web scraping to natural language processing, statistical analyses, and computer vision. Each approach has limitations – described at length in the methodology – and this range of methods has been adopted so that the drawbacks of one are mitigated by the strengths of another.

Yet, while these approaches cumulatively enable us to describe *what* is happening in the online cultural landscape, they do not necessarily give us an explanation as to *why*. For this reason, a mixed methodology was adopted, and digital approaches have been supplemented with a series of interviews with museum practitioners. The experiences of practitioners are integral to this thesis, as ‘success’ online is highly contextual and dependant on a museum’s motivation for adopting a given strategy. Interviews are able to clarify organisational priorities and goals and thus add nuance to the widely reported quantitative metrics.

As will be discussed at length in the literature review, most metrics that supposedly record levels of engagement are poor indicators of the kinds of learning experiences and meaningful discussions museums aim to facilitate. This thesis does not attempt to use quantitative measures as an ‘objective’ benchmark for success. In fact, many of the findings emphasise just how misleading many of commonly quoted metrics can be. It is only through a combination of quantitative and qualitative methods – combined with relevant literature – that it is possible to paint a wide-ranging and nuanced picture of the sector.

1.3 Structure of the Thesis

Having established all the things this thesis will not do, this section will detail the many things it does. Like the majority of digital humanities theses in the UK, it is split into an introduction, literature review, methodology, results, discussion, and

conclusion. This was chosen instead of presenting each study in its entirety – which is more common in the sciences – as there is significant overlap in the findings, literature, themes, and relevant context of each study. The more traditional digital humanities approach enables the literature reviews and discussion to tie together the key elements of this research. However, considering the variety of methods used, both the methodology and results chapters are split into individual studies which are discussed in chronological order. Each study builds on the findings and methodology of the last, and this arrangement best conveys the decision-making logic and methodological developments of the past four years.

Literature Review

The literature review opens with an exploration of why museums are interested in using digital platforms to reach new audiences, contextualising the rhetoric – often invoked during the pandemic – of ‘engagement’, facilitating discussion, and diversifying audiences. It looks back over the last twenty years to contextualise these statements in the wider political and economic landscape of the cultural sector. It will then chart changes to museums’ digital strategies over the past two decades, highlighting the issues facing the sector, before exploring what other researchers found to have changed over the pandemic. Then, the final section, will build on this to explore the barriers facing researchers looking to understand the sector as a whole. It will explore different methodologies, the difficulties of quantifying ‘engagement’, and highlight the drawbacks of digital tools.

Methodology

The methodology continues in this vein, detailing the interdisciplinary approach of the research which borrows from the digital humanities, computer science and the social sciences. It will present each of the six studies and their methodologies in turn. The first is a small pilot study of 315 museum across five platforms, while the second focuses on YouTube and is followed by a case study of a video uploaded by the British Museums. The fourth study is the largest, exploring a dataset of over 3,000 museums across Facebook and Twitter, which is then followed by an exploration of museum websites. Finally, the sixth study is a series of interviews with museum practitioners. This is followed by the ethical considerations, and the chapter concludes on two reflections on the limitations of the methodologies employed.

Results

Chapters 4 and 5 represent the results, and are also split into the same individual

studies. Once again, each is presented in chronological order as the findings and methodologies build on what came before. The sole exception to this is the interviews, which were conducted simultaneously with the quantitative studies. Therefore, in order to ease navigation through a long chapter, participants' responses have been separated out as an additional chapter. These interviews are used to explain the reasoning behind certain trends in the previous studies. Overall, these two chapters highlight how trends in engagement contradict the prevailing narratives of online audiences during the lockdowns. However, the extent to which recommendation and ranking algorithms shape the way we experience culture online becomes increasingly evident over the course of the six studies.

Discussion

The discussion aims to bring together the themes and reoccurring trends of the six studies. It is used to elaborate on the points made during the results chapter, adding additional contextual information and relevant material from the literature review. This chapter ultimately summarises many of the key findings and highlights the implications they have for the sector.

Conclusion

Finally, the conclusion will link these findings back into the initial research questions, and reflect on what this research has contributed to our understanding of museums' work online. As one of the largest and most representative studies of museums' digital strategies, it has helped address the bias in the sector towards large and accredited organisations. It has also resulted in practical guidance for museum practitioners, exploring not only what type of museum social media content performs best, but encouraging reflection on the value of social media metrics by highlighting their incompatibility with most museums' goals. The final section explores the many avenues of research that this thesis has highlighted, and the applications it has within in the global museum sector, digital humanities, and broader public sector.

1.4 Research Outcomes

The following thesis is also a direct result of the many outputs generated by this research over the last four years. The work has been presented at over thirty academic conferences and has resulted in four peer-reviewed academic articles, and a book chapter. Much of this work has been reused and adapted here, with the key works being:

Charlesworth, E., Beresford, A. M., Warwick, C. and Impett, L. 2023, 'Understanding Levels of Online Participation in the UK Museum Sector', *Museum Management and Curatorship* pp. 1–24. <https://www.tandfonline.com/doi/full/10.1080/09647775.2023.2188478>

Charlesworth, E. and Warwick, C. 2026, Digital Publishing Practices in Museums: Old Habits, New Platforms, in C. Ohge and K. Schuster, eds, 'New Directions in Digital Textual Studies: Book History, Scholarly Editing and Curation in Conversation', Bloomsbury Publishing, London, pp. 227–246.

Charlesworth, E., Warwick, C., Impett, L. and Beresford, A. M. 2023, 'Designing for Audience Engagement Exploring the Use of Online Metrics in the GLAM Sector: Exploring the Use of Online Metrics in the GLAM Sector', *magazén* 4(1), JournalArticle_13185. <https://edizionicafoscari.unive.it/it/edizioni/riviste/magazen/2023/1/designing-for-audience-engagement/>

As a consequence, the thesis has benefitted immensely from the generous feedback of other researchers, museum practitioners, and anonymous reviewers. The discussions they inspired have also led to an edited book project – currently under review – that invites contributors to reflect on the role human interpretation plays in digital humanities research.

The findings of this research have a number of applications of within the digital humanities and museum sector, and as such, they have also been disseminated using alternative formats, including a short film, a podcast, and through coverage in an Austrian national newspaper. An executive summary of the findings will also be disseminated across UK museum networks via newsletter to reach more museum practitioners.

The findings themselves are numerous, but there are four key contributions this thesis makes the wider discussion: it creates a representative analysis, that addresses the bias in the existing literature; it provides evidence of the impact of private companies' policies on museums posts and audiences; it resulted in the creation and preservation of multiple datasets capturing a transient and poorly documented online landscape; and developed new methods for data gathering within the cultural sector. Yet, to discuss the full implications of this work on the sector requires an understanding of the surrounding context, including existing practices, endemic issues, and prior scholarship. As a result, a full breakdown of the contributions of knowledge within thesis are presented towards the end in Section 7.5, as a coda to the research.

Chapter 2

Literature Review

This chapter is split into six sections. The first three represent the context in which this thesis was conceived and highlight the issues this research aims to address. As such the sections ‘Aims of Museums’, ‘Museums and the Digital’, and ‘The Pandemic’ present an overview of shifting attitudes towards engagement, online practices, and funding within museums, and explores why quantitative metrics are increasingly important to the sector. The latter three sections – ‘The Search for a Metric’, ‘Recent Developments’, and ‘Post-Pandemic Recovery’ – focus on how this context changed after the outbreak of Covid-19 and the implementation of national lockdowns in the UK. It explores how museums responded, both on-line and off, and the difficulties researchers face in charting the changing digital landscape. The last section focuses on the most recent research in the museum sector – giving special focus to academic studies that utilise digital humanities methods.⁷ It will ask how other researchers have explored the similar questions and explore the limitations of different methodologies, providing a foundation for the next chapter.

2.1 The Aims of Museums

2.1.1 The Rise of the Post-modern Museum

The history of museums is a well-documented one. From their origins in the private collections of the wealthy (Macdonald 1998; McLean 1997), to the establishment of national museums in the nineteenth century, their history has been reiterated and revised by a wide variety of scholars (Woodward 2012).⁸ As Ralph

⁷This literature review does not contain material published after March of 2025.

⁸A notable recent addition to this body of work is Krzysztof Pomian’s *Le musée, une histoire mondiale* (2022). In three volumes, the book presents a global – although still decidedly Eurocentric

Starn noted, while a lack of critical analysis of museums had been condemned in the 1980s, ‘The problem these days is how to navigate the flood of literature on the theory, practice, politics, and history of museums’ (2005, 68). Of this wealth of literature, perhaps the most widely cited work is that of Eileen Hooper-Greenhill. In an attempt to move away from the history of individual institutions to a broader history of museums, she charts a six-century long history that divides their development into distinct phases that draw on Michel Foucault’s *epistemes*: renaissance, classical, modern, and later, the post-modern (Hooper-Greenhill 2000; 1992). It is the last of these – the post-modern museum – that is of most relevance to this thesis.

In a marked shift from a previous emphasis on physical structures and objects, in the post-modern museum emphasis is placed on the visitor experience. Each visit is conceptualised as a process that is shaped by an individual’s prior knowledge and broader social context, redefining museums’ role in society and their relationships with audiences (Cook et al. 2010; Falk and Dierking 2000; 1995). This rising interest in social context, both coincided and drew from the work of postcolonial critics – most prominently Edward Said – who problematised the role of culture as an agent of empire, prompting a questioning of the role colonial power relations had on the interpretation of objects (Barringer and Flynn 2012; Said 1994). The shadow of cultural imperialism has been explored at length by Flora Kaplan (1995), who draws from both anthropology and ethnography to chart a shifting attitudes in both African and US museums. Like many of her peers, she explicitly describes ‘museums as social institutions, as arenas in which political messages in the broadest sense are displayed, conveyed and converted into meaning by museum professionals and the audiences who view and review them’ (Kaplan 1995). It has since become widely acknowledged that the power structures and hierarchies of long-standing western institutions exacerbate existing asymmetrical power relations between communities, complicating museums’ role as facilitators of open dialogue (Schuch et al. 2023; Ashley 2014).

These factors, alongside a changing political landscape, have shaped the way engagement is perceived in the museum sector. Unfortunately, a thorough review of the literature of postmodernist conceptualisations of museums, postcolonial theory, and participatory design, is beyond the scope of what I have space to include here. Instead, this chapter focuses on factors that has shaped the evaluation and quantitative analysis of that engagement, especially with regards to digital technology.

– history of museums and their development (McClellan 2024). Unfortunately, at the time of writing the work has not yet been translated from the French, so has not been elaborated on in my brief historiography in which I have focused on English language texts.

2.1.2 Motivations for Engaging the Public

This section aims to contextualise why there is an emphasis in the UK museum sector on the ability of online technologies to broaden museum audiences, exploring how shifting funding priorities have shaped the ways in which museums measure impact and engagement.

In the UK, a political focus on museums and their ability to foster engagement has a long history. The role of museums in democratising culture was central to many that were founded in the eighteenth and nineteenth centuries, and the twentieth century saw a shift towards engagement and collaboration with local communities (Anderson 2019). However, it is in the 1990s that much of the language and funding structure that shape the UK museum sector today emerge.

During this period, there was a perception that public dialogue was in decline (Ashley 2014). This was considered symptomatic of declining levels of civic engagement; there was a fear that citizens were not actively participating in their communities or in the democratic process (Adler and Goggin 2005). Partially attributed to an increase in multiculturalism in the UK, the discussion saw growing demands for recognition of minority groups, and resultingly, a renewed focus within government on improving social integration and inclusion (Newman and McLean 2004). In this context, cultural participation was seen as a means to increase civic engagement: in part, by opening democratic public discussions to previously excluded voices but also by fostering social inclusion and encouraging dialogue between communities (Long 2013; Putnam 1995). Engagement in this context is not an end, but a mechanism to enact political and societal change.⁹

This is particularly relevant as many museums in the UK rely on either direct government funding or grants distributed through government-run funding bodies such as the Arts Council England (Ballatore and Candlin 2023). Graham Black notes that where organisations have traditionally received public funds ‘there has been an expectation at both the national and local levels that all such bodies, including museums, will actively support relevant political initiatives’ (Black 2010; Newman et al. 2005). This financial arrangement has undoubtedly had some influ-

⁹The efficacy of using cultural organisations in this way is still contested, and both the focus on equal access and participation heavily criticised (Cooke and Kothari 2001; O’ Hagan 2016). Newman and McLean (2004) have problematised public investment in museums on the basis that they improve social inclusion, noting that participation in cultural institutions is not the same as participation in culture. In a later article they argue that culture alone cannot be expected to repair social exclusion – an issue that has its roots in issues with economic integration, housing, and the welfare system (Newman et al. 2005). Most recently, this policy focus on participation has been extensively criticised in Leila Jancovich and David Stevenson’s *Failures of Cultural Participation* (2023), who highlight just how little change has been achieved, despite – and because of – such government policies.

ence on the organisational aims of these institutions, and the focus on broadening their appeal is partially motivated by an increasing pressure to justify public expenditure in the sector through tangible economic and social outcomes (Bailey-Ross 2014; Anderson 2013).

Simon Woodward (2012) has highlighted the extent to which fundraising activities shape museums core services, and he notes they increasingly expected to broaden their services beyond their traditional roles. This can also be observed in the way museums' organizational practices have been shaped by funder's emphasis on evaluating impact and engagement (Aroles et al. 2022).

As Eleonora Belfiore argues, 'impact' has become a proxy for the term 'value' and is indicative the way in which funding is increasingly framed as an 'investment', which expects to see 'returns' and 'healthy dividends' (2015, 101,106). The rhetoric of arts funding more overtly began to borrow from the language of economic instrumentalism in the wake of New Labour.¹⁰ In practical terms, the scope of cultural policy was expanded, and as Laila Jancovich notes, the arts were 'expected to contribute to both economic development and securing a more inclusive society' (2011, 271). Though consistent with the previous Conservative government's policy based on neo-liberal economic values, the new strategy saw the adoption of a 'market driven approach' inspired by the United States (Jancovich 2011). Here the democratic and economic went hand in hand, and 'New Labour's democracy was the democracy of the market' (Hewison 2011).

During periods of increased scrutiny of government spending, arts have repeatedly turned to economic instrumentalism as a form of 'defence' (Belfiore 2015). Jeremy Aroles et al. (2022) argue that this increasingly shapes the priorities of the museum sector.

Increasing financial pressures beget the redefinition of museum priorities in line with the logics of an increasingly 'market-driven' sector – one in which funding agencies exert significant power over the strategic choices available to organizations in the museum sector...
(Aroles et al. 2022).

¹⁰It is certainly true that economic instrumentalism had emerged as potential argument for arts funding earlier in the twentieth century and borrowed heavily from the American debates (Baumol and Bowen 1965; Baumol 1991). As Frederick Burwick notes, while in the 1990s, 'art for art's sake' was 'seldom used without a pejorative sneer', the connotations of the stance being detached from reality can be traced to at least the 1950s (Burwick 1999). A full history of wider arts funding is outside of the scope of this thesis, however, for the interested reader the history of the 'arts for art's sake' doctrine (Bell-Villada 1996) and debates around funding models in the USA (Cwi 1980; Hodsoll 1996; Hart 1984), provide interesting insights into the current UK funding context.

This history is evident in funders' mission statements today, which succinctly summarise the arguments for why the government funds the arts.

Public investment in ambitious, high-quality culture and creativity leads to economic growth. It also builds a healthier, happier and better-skilled society, now and for the future... This is the business we're in at the Arts Council, and it's why public investment in creativity – from taxpayers and National Lottery players – is so important (Arts Council England 2024).

Economic instrumentalism has only been exacerbated in times of austerity, including after the pandemic (Gnezdova et al. 2022). Yet, the result, is that between 2009 and 2023, Public funding in the arts dropped by 10 percentage points, while private donations and earned income from ticket sales both rose by 5 percentage points (Ashton et al. 2024). The UK has one of the lowest levels of government expenditure in the arts in Europe, as either a percent of GDP or per person. As a recent report by the University of Warwick's Campaign for the Arts highlights, 'Across [European] countries in 2022, the mean average share of GDP invested in culture was 0.74%. In the United Kingdom it was 0.46%' (Ashton et al. 2024).

2.2 Museums and the Digital

2.2.1 Early Years of Museums Online

This context is useful to fully understand the sector's response and public appeals during the pandemic. Many museum professionals framed the digital shift as an opportunity to diversify audiences and reach beyond museums' traditional visitors (Noehrer et al. 2021; Samaroudi et al. 2020; Mantell and Turpin 2020). Museums thus cast themselves as hubs and community spaces, and argued they could perform this role digitally (ICOM 2020a; ICOM 2020b).

The potential for new media to facilitate a dialogue has excited museum professionals and academics since the internet first emerged (Walker 2016). George MacDonald and Stephen Alford (1997) were just a few of the many voices in the 1990s arguing that digital technologies would transform the way museums communicate with their audiences. It was believed that by embracing digital technologies and using them to create a conversation with audiences, museums could realise a more participatory approach that shifted the focus from their collections

to their visitors – creating an ‘audience-driven museum’ (Hooper-Greenhill 1992; 1994; Falk and Dierking 2000). Phillipe Avenier summarised this optimism in 1999:

It is now generally acknowledged that museums have gained significantly from the giant technological strides associated with the growth of the Internet. Nobody indeed disputes that the widespread dissemination of information and knowledge about museum collections is an added step towards the democratization of culture (Avenier 1999).

The interactive nature of the web challenged the prevalent idea that digital interactions were ‘solo visitations’, or exclusively an interaction between the visitor and the device they are using (Schweibenz 2013; Bandelli 1999). Andrea Bandelli highlights that while discussions between two visitors seldom happen inside galleries, ‘the same two people on the Internet, however, can engage in a conversation much more easily’ (1999, 22).

This belief became more prevalent with the emergence of social media in the 2000s (Black 2021). With its greater levels of peer-to-peer interaction, the social web further shifted publishing practices towards a participatory culture in which anyone can publish and disseminate texts (Lievrouw 2010; Jenkins 2009; Shirky 2008). This blurring between consumer and producer rapidly transformed the media landscape (Bødker 2016; Kaplan and Haenlein 2010). This transformation is compelling described by Jay Rosen (2012) in the chapter *The People Formally Known as the Audience*. Drawing on the history of print media, he argues that control of the ‘printing presses’ changed hands with the advent of the internet; blogs had undermined the ‘old-style, one-way, top-down media consumption’, and in doing so had irrevocably transformed the balance of power between producers and audiences (Rosen, 2012, 13). The radically democratised communication the internet offered challenged notions of expert authorship integral to museums’ existing modes of publishing, and many museums struggled to adapt (Deodato 2014; Fransen-Taylor and Narayan 2018).

In his seminal article, published in 1997, Peter Walsh described the hesitancy of institutions to adapt to the norms of online communication. He argued they propagated institutional authority by adopting the ‘Unassailable Voice’. This voice – which delivers ‘polished, endless monologues’ – assumes that ‘that museums have the knowledge and then benevolently dole it out to the comparatively ignorant public’ (Walsh, 1997, 78-79). This somewhat patronising approach is the antithesis of democratised modes of communicating online where a plurality of voices and opinions have found a platform (Schweibenz 2013). Jennifer Trant

aptly summarised the issue, describing museums as facing ‘an onslaught of interpretations of culture from an incredible number of sources, and forced into an awareness that they are no longer the sole interpreters of their collections’ (1999, 107). Over the following decade, the sector remained resilient to change (Giannini and Bowen 2019; Gombault et al. 2018; Bowen 2010).¹¹

2.2.2 Remaining Barriers

Of course, this slow uptake of digital technologies was not purely driven by attitudes, but was exacerbated by a lack a resources and expertise (Gombault et al. 2018). UNESCO identified five necessary conditions for a museum to implement a digital policy:

(1) the digitisation of collections, which itself relies on (2) a sufficiently up-to-date inventory of collections, (3) a minimum IT infrastructure (photo-taking, scanning, computers), (4) sufficiently stable Internet access and (5) dedicated staff with the minimum skills to carry out these various operations. (Mairesse and UNESCO, 2019, 15)

An extensive body of literature documents the difficulties of meeting these requirements, and museums face a number of challenges ahead of digital adoption: a lack of resources; rapid technological obsolescence; language barriers; attitudes of management; a lack of brand recognition or audience awareness; and uncertainty around image rights are but a few (Nikolaou 2024; Leoni and Cristofaro 2022; Papadimitriou et al. 2016; Bailey-Ross 2014; Murphy 2014).

2.2.3 Increasing Social Media Adoption

However, social media has become increasingly important as museums adopt participatory practices (Simon 2010). Mia Ridge highlighted the use of these platforms for recruiting participants for museums as well as academic research (Ridge 2014). Other well-loved and highly successful museum social media initiatives include the Grant Museum of Zoology’s ‘Glass Jar of Moles’ – which featured prominently in the first #MuseumMascot day – and more recently Adam Koszary’s viral

¹¹There were of course some exceptions, and museums with the resources and expertise – often in the form of affiliated universities – quickly embraced the opportunities presented by the world wide web (Bowen 2010; Giannini and Bowen 2019). Notable pioneers in the UK included the Science Museum and Natural History Museum who collaborated with Imperial College London to join the JANET academic network (Bowen 2010).

tweets for the Museum of English Rural Life, which garnered thousands of interactions (Deakin 2021; Douglas and Koszary 2018; Warwick 2013). Success stories like these, alongside the eventual ubiquity of social media have helped museums shake their initial hesitancy, resulting in a significant shift, or ‘digital pivot’ over the last decade (Wong 2011; Parry 2010a).

In the UK, the vast majority of adults with online access use social media; 94% of them have a Facebook account, and 92% use YouTube (Ofcom, 2022a, 32). The perception of social media as widely used public platform has made it an attractive option for museums to tangibly, and at little cost, commit to broadening their audiences and making their organisations more accessible (Walker 2016; NEMO 2020b). Research by Nesta – formerly the National Endowment for Science, Technology and the Arts – found that in 2017, 57% of museums wanted to use social media to reach larger audience, and publishing on social media is now common practice within the museum sector (2017, 9). Larkin et al. found that 77% of all museums in the UK have a Facebook account and 67% use Twitter (Larkin et al. 2023). This percentage is significantly higher than the 60% of accredited museums that are estimated to use their own websites as a publishing platform (Charlesworth, Warwick, Impett and Beresford, 2023, 10). Social media use was on the rise, despite the falling number of museums ‘maintaining a blog, and publishing to a website’ – social media provided a ‘potential substitute’ and appears to be usurping museums’ websites as the primary place audiences can learn more about a museum (2017, 11). This sets the scene for the uptick in social media use during the pandemic in the face of site closures (UNESCO 2020; NEMO 2020b; Larkin et al. 2023).

2.2.4 A Failure to Adapt

Yet, the efficacy of the digital – and especially social media – at increasing engagement and widening audiences is disputed. In 2011, the demographic analysis performed by Culture24 ‘led the group to question whether the cultural sector is in fact attracting new audiences online, as has traditionally been assumed, or is simply engaging with the same audiences that they interact with offline.’ (Finnis et al. 2011). On also discovering that their social media reach mirrored their on-site visitors, many co-creation initiatives have foregone social media use in favour of on-site participation (Barnes and McPherson 2019; Holdgaard and Klastrup 2014). A US-based survey of 1,258 arts organisations by the Pew Research Centre, found that ‘93% of arts orgs say that social media helps them reach a broader audience than they would otherwise be able to’, however, that less than 8% of Twitter users in 2011 followed a museum (Purcell 2013). They go

so far as to characterise social networking as ‘connecting with superfans’ (Purcell 2013).

The available empirical analysis on cultural institutions’ social media habits shows that museums do not participate or become active members of online communities. In the early period of social media adoption in the sector, Angelina Russo and Darren Peacock (2009) criticised museums for having ‘been overly focused on what they themselves might get from social media systems, not on understanding and nurturing their dynamics’. Yet, throughout the 2010s, the majority of museums did not embrace the participatory nature of social media or interact as members of an online community. In a survey of 315 American museum practitioners, Adrienne Fletcher and Moon J. Lee (2012) noted that amongst the early adopters of social media, few museums embraced the posting norms of the platforms they used. They highlighted that 60% of respondents used social media for advertising events, and only 11% claimed to use it for ‘dialogic/conversational engagement’ (Fletcher and Lee 2012). This finding was reinforced by Sigurd Gronemann et al. (2015) who found that museums tend to use Facebook as a ‘message board’ with little interaction with online visitors. While the authors noted that museums used informal language and casual modes of address, they predominantly posted in ways that ‘maintain institutional authority’ (Gronemann et al. 2015).

In a study of science museums’ use of social media, Paige Brown Jarreau et al. (2019) argue that museums have not adopted common but successful strategies such as including personal narratives or incorporating people in photographs. By rarely reposting other accounts’ content, museums fail to actively engage with or build online communities. The trend is not confined to science-orientated or European museums; Xiaole Zhu and Yoonjae Nam (2022) found that online communication strategies across 204 Chinese museums were also one-directional, and the use of Weibo and WeChat – two Chinese social media platforms focused on disseminating information. Despite vast shifts in the cultural landscape over the last twenty years, museums’ continue to adopt the ‘Unassailable Voice’ (Walsh 1997).

A series of surveys conducted by Dominic Walker (2016), highlighted the disconnect between what audiences expect from museums online, and what museums publish; ‘the overwhelming impression of most [followers] is that museums post about new events and exhibits... substantially more than the approximately 29% [of followers] desiring these kinds of posts’ (Walker, 2016, 203). Similarly, in a study of Italian state archaeological museums, Michela Arnaboldi and Melisa L. Diaz Lema (2021) found that while updates about the museums’ agenda and pro-

gramme received little response, posts about collections were positively received. Despite this, they noted that ‘only 11% of the messages is centred on the museum's permanent collection’ (Arnaboldi and Diaz Lema, 2021, 11). As Michela Arnaboldi and Melisa Lema have summarised, ‘multiple studies have demonstrated that is not enough for museums to have a social media presence, it is what they do with it that matters’ (2021, 4). More recently, in 2021, Cassandra Kist explored the persisting critiques of museums ‘signalling openness’ and highlighted the incompatibility of museums’ infrastructure with participatory social media practices (2021, 291). Reinforcing the early findings of Fletcher and Lee, she argued that ‘many institutions prioritize marketing and broadcasting motivations for social media use over engagement, participation and associated social goals’ (Kist, 2021, 282).

2.2.5 A Focus on Footfall

This may have contributed to the way in which audiences access museum websites. The UK Taking Part Survey – the flagship survey of the Department for Digital, Culture, Media, and Sport (DCMS) (2021) – found that in 2019, English audiences most commonly used a museum website to ‘to find out about an exhibition or event’ (75%), ‘to check opening times’ (64%), and ‘to order tickets for an exhibition or event’ (40%). The majority of online visits were therefore directly related to on-site activities. Only 27% of respondents accessed a museum website looking to ‘find out about a particular subject’, and only 12% wanted ‘to look at items from the collection’ (Department for Digital, Culture, Media & Sport 2020).¹² Most importantly, despite many museums committing to make more information about their collections available online, this proportion represents a decrease from the previous year (Department for Digital, Culture, Media & Sport 2019).

In many organisations, online content is still seen as a subsidiary of the on-site experience, the NEMO survey found that prior to the pandemic, websites were often seen as ‘extensions and complements of physical museums’ (NEMO, 2020b, 3). Bandelli’s early work on virtual experiences focuses on the way the digital environment ‘overlaps’, ‘overlays’, and is ‘superimposed on the real one’, and research has predominantly focused on the digital’s ability to improve the on-site

¹²It should be noted that this report explores engagement with ‘heritage’ and ‘arts’ organisations separately from ‘museums and galleries’. While levels of on-site attendance differ significantly, the answers to the ‘Top five most commonly reported reasons for visiting a [museum, heritage, or arts] website’ are remarkable similar across the three sectors (Department for Digital, Culture, Media & Sport 2021).

experience (Bandelli 1999; Galani and Chalmers 2010).¹³ Little has been written on online exhibitions or social media as a means of engaging visitors in their own right (Hughes 2012; Parry 2021). Writing in the context of the Nordic Museum sector, Kajsa Hartig argued for a shift to ‘digital-first’ approach.

...as long as the museum is not considering online as important as the exhibition, there will never be enough resources allocated for content, conversation and audience engagement delivered as online experiences. There will not be an incentive to build capacity for more than the marketing of exhibitions (Hartig 2018).

Instead, the focus is often placed on how effective online strategies are at increasing footfall within the museums.¹⁴ An article by Jia Shi exploring the percentage of 270 European museum using social media between 2019 and 2020 effectively summarises the claims, stating that Facebook use results ‘in increased foot traffic as previously unaware individuals are motivated to arrange visits’ (Shi 2024). No evidence is presented to support the claim within the study, however, it is common to hear supported by anecdotal evidence or internal surveys conducted by museum practitioners (Hannon 2014).

Despite it being a primary motivation for many organisations adopting these platforms, assessing to what degree social media impacts visitor numbers is difficult (NEMO 2020b). A study by Adela Coman et al. of 14 museums identifies a statistically significant correlation between the number of visitors to a museum and the number of followers it has on Facebook. They make the claim that ‘By conducting this research, the importance of social media in attracting visitors can be easily deduced.’ (Coman et al., 2020, 453). However, while correlation is evidenced, causation is not. The paper is not able to establish that people went to visit because they saw the museum on social media. There are a number of causes – including marketing budgets, press coverage, perceived quality of experience, and block-buster exhibitions – that could impact both a museum’s online and on-site popularity. This would result in a correlation but does not suggest that seeing the museum on social media is what led people to visit. Fletcher and Lee

¹³This extends to all form of digital content. Ellie King invokes Nicole Meehan’s argument ‘that the continual insistence upon conceptualising the digital museum object in relation to its physical counterpart precludes full understanding of its value and agency’, and criticise museums for ‘hold[ing] on to the physical–virtual overlap’ (King et al. 2021; Meehan 2020). King extends the argument, stating that online exhibitions ‘are not simply a second form of a physical exhibition, but instead an exhibition in their own right offering something unique yet equally valuable to museum visitors’ (King et al., 2021, 498-499).

¹⁴For a comprehensive literature review of pre-pandemic literature see ‘Engaging the Museum Space: Mobilizing Visitor Engagement with Digital Content Creation’ (Bailey-Ross et al. 2016).

had also highlighted this difficulty, noting that museum practitioners were ‘unable to determine whether the people who clicked that they ‘liked’ [a class run at the museum], actually ended up enrolling for a class or not’ (Fletcher and Lee 2012). Establishing this causation would be incredibly difficult, in part due to the number of different contributing factors to attendance levels.¹⁵

As Antonio Padilla-Meléndez and Ana Rosa del Águila-Obra argue – the web provides access to ‘a worldwide network of potential visitors’ (Padilla-Meléndez and Del Águila Obra, 2013, 892). It offers the opportunity to market the museum to visitors globally, and Hasan Bakhshi and David Throsby highlight is able to ‘overcome the traditional constraints imposed by physical location, thereby expanding their audience reach’ (Bakhshi and Throsby, 2010, 4). Yet, the use online content as a facilitator of the physical experience, arguably does not realise the full potential of social media and the new forms of engagement and business models it may offer (Bakhshi et al. 2010; Bakhshi and Throsby 2010). In a study of the Sydney Opera House and World Heritage sites, Cristina Garduño Freeman argued that ‘Most people’s experience of World Heritage is now a digital one... many people who engage with World Heritage will never physically travel to the actual site’ (Garduño Freeman 2018a; Garduño Freeman 2018b). To focus on physical experiences, limits online engagement to the few who will be able to travel to the museums, and arguably ignores the new forms of engagement and diversification of revenue streams online exhibitions could bring.

2.3 The Pandemic

2.3.1 Museums Online During Covid-19

Despite the doubts cast on the approach museums were taking on social media, when museums were forced to close their physical sites during the Covid-19 pandemic, many turned to the platforms to engage with audiences at home. This rapidly accelerated the pace of digital adoption in museums and a significant shift in the way they utilised online platforms (Parry 2021). Initially seen as a way to mitigate the impact of the Covid-19 pandemic and meet a perceived demand for cultural content, many organisations were able to pivot to digital by uploading previously digitised resources to social media (NEMO 2020b). This increased online output led to an enormous range of free-to-access content online,

¹⁵The question of whether visitor numbers increase as a result of social media posting is discussed at length in Section 3.10.

and a shift away from the previous trend of conceptualising digital resources as supplementary to on-site visits (NEMO 2020b).

As the severity of the Covid-19 pandemic became more evident, a number of large-scale reports were published charting museums' responses. The Network for European Museum Organisations (NEMO) released their *Survey on the impact of the Covid-19 situation on museums in Europe* in early May (2020b), analysing nearly 1,000 survey responses from 48 countries across Europe. Conducted primarily between the 24th of March and the 30th of April, it is notably optimistic, with many museums intending to reopen in May or June of 2020.¹⁶ Even at this early stage, online content was highlighted as a potential way to mitigate the impact of site closure on museums. Of the survey's ten findings, the latter five are dedicated to museums' digital response:

1. **4 out of 5 museums have increased their digital services** to reach their audiences, often by having staff take over new tasks to cope with the circumstances. Almost half of the respondents stated that their museum is now providing one or more new online services.
2. **2 out of 5 museums reported an increase in online visits, ranging between 10 to 150%** during the reporting time.
3. Without additional input, there is no increase in output: Our survey has shown that the **museums that were able to change staff tasks and/or add resources were also able to increase their digital services and observed an increase in their online visits.**
4. People seek museums because of their education and collections related content. Museums reported that next to social media, both **educational and collections related materials**, including video and film content, **were most popular** with online audiences.
5. This survey has evidenced that museums online are important extensions and complements of physical museums, but that a **sound metric to benchmark online visits is missing** (NEMO, 2020b, 2-3).¹⁷

As the scale of the pandemic became more evident, the focus and tone of reports shifted. By the end of the same month, a UNESCO report, 'Museums around

¹⁶The NEMO interactive map (2020a) charting reopening plans was updated throughout the pandemic and became a useful resource for comparing national responses. Unfortunately, it is no longer accessible.

¹⁷The emphasis is true to the original report.

the world: In the face of Covid-19', estimated that 90% of museums worldwide were forced to close (UNESCO, 2020, 3). While there was initially much hope for online activities to mitigate some of the effect of the pandemic, this report makes clear that the fast pace of digital adoption exacerbated existing issues within the sector, finding that the 'digital divide is more evident than ever' (UNESCO 2020). This is in part because of the reliance on museums during Covid-19 on previous digital investments. The report finds:

Many institutions have taken advantage of the digitisation and digital communication work done on existing collections (online collections, 360° tours, virtual museums, online publications, digital exhibitions) to showcase them more effectively. In this context, the Google Arts & Culture website has been the subject of great interest (especially with traditional media)... A large number of institutions have also put digital productions, applications and games from previous exhibitions back online to give them a new lease on life (UNESCO, 2020, 15-16).

Larger museums – those with dedicated digital departments and previous digital investment – saw the largest rise in visitor numbers to their websites over the first lockdown period. This exacerbated the existing inequalities in museums' ICT investment (UNESCO 2020; Mairesse and UNESCO 2019). The necessary conditions for digital participation became significantly more difficult to meet during the lockdowns: 'dedicated [digital] staff' were furloughed; offices were inaccessible, limiting access to existing 'IT infrastructure'; museum sites and storage were also inaccessible, preventing the new or continuing digitisation of collections; and remote working policies meant that 'sufficiently stable Internet access' was dependant on individual staff members' amenities (UNESCO, 2020, 15). The way that these limitations shaped museum responses to the pandemic is clear in the aforementioned 2020 report. It highlights the most prominent digital practices:

1. Use of previously digitised resources
2. Digitisation of planned activities during the months of lockdown
3. Increased activity on social media
4. Special activities created for lockdown
5. Professional and scientific activities organised in the context of lockdown (UNESCO, 2020, 15-16)

The prevalence of these strategies varied significantly throughout the world (Figure 2.1), and the first, the ‘use of previously digitised resources’, proved the most popular response globally. In a piece for the *Museum Journal*, Nicola Euston highlights that in the Victoria Gallery & Museum, ‘One of the first things [they] did was add additional content to the existing exhibition web pages enabling visitors to view exhibitions from their own homes’. Yet, their ‘biggest challenge has been trying to create content when we did not have existing digital material’ (Euston 2020).

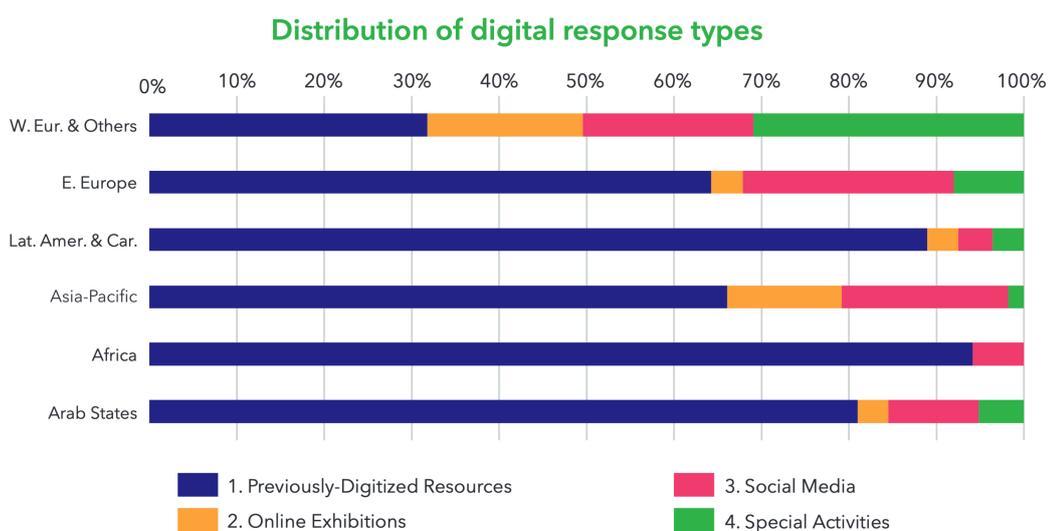


Figure 2.1: Breakdown of the digital responses by region from the 2020 UNESCO report (UNESCO 2020).

Notably, it is only in ‘Western Europe & Others’ that there was a significant volume of content created specifically for the lockdowns.¹⁸ From the data, it can be assumed that members of this group are more likely to have significant digital resources and funding to create new content during the pandemic required both staff labour and up-to-date technology (NEMO 2020*b*; UNESCO 2020). Therefore, the creation of new content was beyond the reach of many smaller museums, especially those without existing digitised resources (Larkin et al. 2023).

An institution’s size makes a notable difference to a museum’s relationship to online content. A later NEMO study from 2020 found that 60% of the 650 participating museums had not noticed an increase in online visitors, yet a small group of (5%) saw an exceptional increase of up to 200% (NEMO 2020*b*). That the majority of museums had not seen an increase in online visitors was further corroborated by

¹⁸However, it is difficult to draw further conclusions on Western European practices from this data. Of the 61,634 museums in this category, 33,000 are North American museums – the unspecified ‘& Others’ – which have a large effect on the statistics (UNESCO, 2020, 21). Without the full dataset, and individual country data, conducting further analysis is impossible.

an Art Fund survey conducted during the first UK national lockdown. It found that ‘less than half [of museums] have seen an increase in online visitors to their websites’ although they did not that ‘there are reports of significant increases in engagement with social media content’ (Art Fund, 2020, 19).

2.3.2 A Discrepancy in Accounts

This complicates the narrative that emerged at the beginning of the pandemic, which claimed that digital content was able to reach beyond museums’ traditional audiences to engage with a wider community (Samaroudi et al. 2020). In a survey of ten sector experts, Lukas Noehrer et al. (2021) found that digital resources were seen as an opportunity to diversify audiences in the face of Covid-19, a belief which was supported by early surveys measuring digital engagement (Mantell and Turpin 2020).

The publication of the first large-scale study challenged this common account of the pandemic. A decade after Culture24 questioned the efficacy of museums’ online strategies at gaining new audiences, the Cultural Participation Monitor – a project which included a series of surveys with over 6,000 correspondents – corroborated this finding, and found that those who engaged online were ‘more likely to have been regular in-person arts attenders’, noting ‘more than half of audiences engaging with Museums and Heritage online are aged 55+’ (Walmsley et al. 2022). Similarly, the profiles of online audiences during the pandemic were discovered to be similar to in-person visitors in 2019, with only 17% of online audiences coming from demographic groups with low average levels of engagement, compared with 20% of physical visitors (The Audience Agency 2021). This work by the Audience Agency has highlighted the continuing discrepancy between the rhetoric of broadening access and organisations’ actual ability to reach new audiences. As they reflected in the findings of the project, ‘digital distribution is not the great equaliser or diversifier that much of the sector was hoping it was and even claiming it to be’ (Walmsley et al., 2022, 68).

2.3.3 A Lack of Data

This discrepancy was exacerbated by the absence of large-scale quantitative analysis at the start of the pandemic, and it was unclear to what extent engagement with digital content was changing across the sector. Despite the fact that ‘senior leadership teams became significantly more metric aware’, a lack of expertise has hampered data collection – an issue that was more acute in smaller organisations

without existing digital resources (Noehrer et al. 2021; Newman et al. 2020; UNESCO 2020; Travkina and Sacco 2020). This lack of data was compounded by the lack of digital and statistical expertise within most museums; Nesta has found that ‘the majority of arts and cultural organisations still do not use data for important purposes such as understanding their audiences better through data analysis and profiling’ (2017, 5). This emphasises the need in the sector for large-scale quantitative metrics to create a benchmark against which GLAM professionals can evaluate survey results and their own anecdotal experience. This resulted in significant investments in training museum practitioners across Europe and the UK, with major initiatives including inDICEs’ Europeana Impact Framework by the EU’s Horizon programme and the National Lottery Heritage Fund’s Digital Skills for Heritage (inDICEs 2023; National Lottery Heritage Fund 2021).

But what would good data look like? Given the funding context discussed, it is clear that things like page views and social media interactions are a stand in for engagement, which in turn, is a proxy the social inclusion and civic engagement that the museums are trying to foster. It is these that we would ideally like to measure. Yet the ‘social inclusion’ generated through museums is difficult to quantify and almost impossible to capture at scale – an issue that similarly plagues measures of audience engagement within museums (Coombs et al. 2013; King 2024). This next sections will explore the difficulties of using platforms’ social media metrics, while sections 2.4.5 to 2.4.9 explores alternatives tools that have emerged – including sentiment analysis, topic modelling, network analysis, and computer vision – for creating such a benchmark.

2.4 The Search for a Metric

It was in this context that this thesis was conceived, and it set out to present such a benchmark. It addresses the repeated calls for better data to help museums understand both their audiences, and the reception of their digital strategies. This section details the difficulties of this task: presenting the limitations of quantitative analysis; the difficulty of analysing social media platforms; and the research that has been conducted so far in the field.

2.4.1 The Difficulties of Quantifying Engagement

Quantifying something as intangible and broad as engagement presents a number of difficulties. The Culture Metrics project, launched in 2014, aimed to address

these issues, involving cultural organisations in the process of establishing standardised metrics for the museum sector. A versatile survey was designed to work across multiple contexts; participants scored different aspects of an event or visit on a sliding scale. In describing the project, Arvanitis et al. (Arvanitis et al. 2016) noted the benefit of this approach; ‘The use of standardised metrics across organisations potentially allows for comparisons among them and among different kinds of events and over time’. The Culture Metrics team developed a platform in partnership with Culture Counts which automated the analysis of the results, and in 2016, Arts Council England announced that using the Culture Counts framework would become ‘a mandatory requirement’ for organisations that received over £250,000 a year (Gilmore et al. 2017; Arts Council England 2016). This decision, which was later revoked, was met with vocal opposition. Phiddian et al. noted that the issue was not with the metrics themselves but in the way that they were being used as to assess artistic quality; ‘The categories are nuanced enough to provide usable feedback for practitioners and bureaucrats with the time and desire to think hard about what the numbers mean. But, they remain essentially marketing analytics rather than a window on artistic value’ (2017, 178). What is a helpful tool for well-meaning practitioners can, in other hands, be used to ineffectually rank relative performance.

Taken in isolation, quantitative metrics have been found to alter how we conceive of value and are a simplification of a vast array of outcomes and motivations which are unique to each organisation (Espeland and Sauder 2016). The Culture Counts example highlights the importance of context for any metric, and the goals of a project should inform the methods we use to evaluate success. As Phiddian et al. argue, the adoption of framework across all grant recipients would ‘imply a spurious homogeneity of purpose in the arts’ (2017, 178). Suzy Glass similarly noted, ‘the importance of data isn’t the data by itself. It’s the possibility of self-awareness and self-reflection that it brings to bear to make us better’ (2015, 5). This highlights a major limitation of quantitative metrics. Even at its best, quantitative analysis is able to describe institutional motivations or the underlying causes of a given trend. Without supplementary interviews or surveys, the motivations and reasoning behind visitor or organisation behaviour is opaque, limiting how useful this form of feedback is for learning (Kidd et al. 2022).

There are remaining issues even if a metric was found to accurately reflect audience engagement. If a metric was used during the development process to test projects and exhibitions, museums may inadvertently optimise content to maximise the metric, as opposed to maximising engagement. This issue is summarised in Goodhart’s law, which was succinctly described by Strathern, ‘When a meas-

ure becomes a target, it ceases to be a good measure' (1997, 308). The principle is most commonly observed in education, where students learn to pass the exam, not understand the material (Fire and Guestrin 2019). This could result in online content that has high levels of engagement on paper, but a poor visitor experience. This issue can only be combatted with extensive user testing and verbal feedback, a process that should not be side-lined in favour of cheaper and more readily available quantitative metrics.

2.4.2 The Pitfalls of Social Media Metrics

Qualitative methods are widely used across the sector, yet in the absence of a specific metric for the cultural sector, many museums have begun using the metrics provided by social media platforms, as they are the most accessible and widespread metrics available to museums. In the UK, it is more common for a museum to have a Facebook account than their own website (Charlesworth, Warwick, Impett and Beresford, 2023, 8). Larkin, Ballatore, and Mityurova found that 77% of museums had a Facebook account, and 67% had Twitter (2023, 6). This high uptake was true across small and medium sized museums, making measures of social media engagement – such as ‘likes’, ‘views’, and ‘shares’ – an already widespread form of standardised metric.

However, it is questionable whether these metrics accurately reflect the meaningful inter-community connections that museums hope to facilitate. ‘Likes’, ‘reach’, ‘page views’, and ‘shares’, are all metrics that are predominant designed to serve the customers of social media sites – that is advertisers (Gillespie 2010). To clarify what these terms mean, Facebook (2024a) produced a disambiguation which declares:

Page views are the number of times that a Page's profile has been viewed by people, including people who are logged into Facebook and those who aren't.

Reach is the number of people who saw any content from your Page or about your Page. This metric is estimated.

Impressions are the number of times any content from your Page or about your Page entered a person's screen.

The substitution of ‘was loaded into a browser’ with ‘saw’ is misleading, especially when ‘entered a person’s screen’ is also used. Short of implementing eye-tracking technologies on every device, it is impossible to tell whether a user was

looking somewhere else, either on their screen or off. In short, these metrics are not analogous to the number of people who see, read, or think about a post.

Nancy Baym (2013) has highlighted the fallibility of these metrics as evaluative tools. She emphasises the way these metrics are decontextualised by removing them from the original interaction and the ambiguity of what it means to like a post. Researchers have found that it can be used to indicate approval, expresses discontent, or used to aid identity-building within an online community (Ji et al. 2019). Building on the work of Jodi Dean (2005), Baym also highlights the fact that posts' content and meaning is irrelevant to companies that own the platforms, which only care about the circulation of posts. These metrics have been developed with commercial motivations in mind (Meta 2024; Grosser 2014), and should be used with caution when adapted for a different purpose – especially as an evaluative tool for community building or facilitating education. In this case, it is worth pointing out the obvious: social media engagement does not necessarily correlate with engagement in the sense it is used in the museum sector.

2.4.3 Recommendation Algorithms

Baym (2013) also notes that social media metrics' usefulness is undercut by the fact that social media recommendation algorithms foregrounding some posts over others. These recommendation algorithms work by suggesting new content to a user based on their engagement or watch history. Examples include YouTube's 'up-next' and 'recommended' videos, but similar mechanisms are found across the majority of social media platforms. It is incredibly difficult then, to use metrics to compare how well a post or piece of content was received by audiences as the recommendation algorithm unevenly 'pushes' some posts over others. As a consequence, generally posts that are shown to more people have higher metrics.

As Tarleton Gillespie, a principal researcher at Microsoft, observes, the use of 'platform' has obscured the way that sites such as Twitter, Instagram, and Facebook, shape these spaces – 'Platform downplays the fact that these services are not flat' (Gillespie 2017).

To the degree that information intermediaries like YouTube claim to be open, flat and neutral spaces open to all comers, the kinds of interventions and choices these providers actually do make can be harder to see... Whether these interventions are strategic or incidental, harmful or benign, they are deliberate choices that end up shaping the contours of public discourse online (Gillespie, 2010, 358).

As the companies who own social media sites are not obligated to disclose how their models, it is unclear to the developers, users, and researchers how it functions (Bishop 2018). As such, many have tried to reverse engineer what type of content these recommendation algorithms prioritise.

However, a growing body of research indicates that the most widely shared content provokes strong emotions (Tsugawa and Ohsaki 2015; Berger and Milkman 2013); alarmingly, Ji et al. (2019) found that Facebook posts that roused negative emotions were more likely to be shared than positive posts.¹⁹ This same trend was identified on Twitter, where Yiyi Li and Ying Xie's (2020) analysis of tweets and their associated images using computer vision, found that those with negative sentiments were more likely to be shared and those with positive sentiments are liked. While researchers have highlighted the role of emotional contagion and social norms in this process (Xu et al. 2022), it is theorised that heightened negative emotional arousal leads to underestimating how much time has passed (Ogden et al. 2019; Volkinburg and Balsam 2014), and that is likely beneficial for social media companies to encourage this behaviour as it increases interaction and the duration of a session (Park et al. 2021). This poses an issue to fair evaluation and comparison. As Michela Arnaboldi and Melisa Diaz Lema concluded in their study of Italian Archaeological museums, 'the platform itself also determines the rules of dissemination, and the percentage of followers who are shown the material may vary continuously' (Arnaboldi and Diaz Lema, 2021, 12).

Even once the recommendation algorithm is removed from the equation, certain forms of content prove much more effective at generating interactions. A recent collaborative study between Maynooth University, Trinity College Dublin, and Montclair State University, explored which forms of content – having minimised the effect of Facebook's algorithms – were the most effective at encouraging interactive behaviours such as 'clicks', 'likes', 'comments', and 'shares' (Moran et al. 2019).

In general, all rich media formats encourage more clicks than static plain-text content, but video-based content has the greatest impact on encouraging clicking behaviors, thus videos are the best source of encouraging content discovery (Moran et al., 2019, 541).

¹⁹Numerous studies on the adverse effects of recommendation algorithms on mental health, political polarisation, and medical misinformation, have highlighted the pitfalls of such algorithms (Allen et al. 2024; Popat and Tarrant 2023). Combined with the takeover of Twitter by Elon Musk, over the duration of this thesis there has been a significant shift in the public-discourse around social media, with the Australian parliament banning social media for under-16s, and further bans discussed in the UK (Ritchie 2024; BBC 2024).

Therefore, even without the impact of recommendation algorithms, comparing levels of engagement between different media would be misleading. ‘Content’ is a prevalent term that flattens a number of diverse media into a homogenous and easily consumable unit (Hartig 2018). The use of it in the museum sector was criticised by Johan Belin, who articulates the hesitations of many museum professionals, ‘the way the word “content” is used in the industry makes it sound like it doesn’t have any value, it is just whatever you put in the ad unit’ (Belin 2018).²⁰ He highlights that relations mediated by these platforms are transactional: like all facets of the ‘attention economy’ the value is placed exclusively on the audience’s attention.

2.4.4 Platformization

The reduction of learning, reflection, and meaningful dialogue, to a commodifiable ‘attention’ transforms culture into a commodity and adopts the economic logic of the companies that own these digital platforms (Nieborg and Poell 2018).²¹ Jean-Christophe Plantin et al. describes this ‘platformization’ where ‘Digital technologies have made possible a “platformization” of infrastructure and an “infrastructuralization” of platforms... media environments increasingly essential to our daily lives (infrastructures) are dominated by corporate entities (platforms)’ (Plantin et al. 2018). This sees public institutions increasingly rely on privately owned infrastructure (Poell et al. 2019),²² and reaches beyond museums to span education (Pangrazio et al. 2022), science (da Silva Neto and Chiarini 2022), journalism (Zaid et al. 2022), and non-profit organisations (Mos 2021).

As David Bearman (1995) highlighted thirty years ago, when it comes to digital technologies museums are competing with commercial interests that have very different priorities to the educational and outreach goals of museums. For the most part, the priority of these companies is increasing the amount of time users spend on the site. In 2023, Meta saw their largest profit in years, which they attributed an increase in the amount of time users were spending on Facebook (7% increase) and Instagram (6% increase) (Meta 2023b; Meta 2023b). Mark Zuckerberg

²⁰Belin also highlights the frustration of search and retrieval on the platforms: ‘just some hours from when you saw that amazing video it is gone, even if you do a search it is almost impossible to find, production value wasted and soon it is forgotten’ (Belin 2018).

²¹Notably this flattened framework parallels the ‘datafying’ of museum operations and funding imperatives that was so derided by museum practitioners (Nieborg and Poell 2018; Belfiore 2015).

²²This is not a uniquely digital phenomenon. Discussions about Twitter and its new de-facto role as a public forum despite being privately owned led commentators to draw parallels to the ‘privately owned public spaces’ in major cities (Kerssens and Dijck 2021; Naughton 2022; Nunziato 2019). Although both of these spaces are treated as though they are public forums, as they are privately owned users rights to protest and free speech are not protected (Naughton 2022; Kayden 2000).

attributed this increase to ‘recommendation improvements’, which consequently has improved the company’s advertising revenue (Paul 2023).

In addition to shaping the data researchers are studying, platforms also have discretion over the data researchers are able to access. The use of application programming interface (APIs), is used by these companies to allow access to the data gathered in their platforms (Google Developers 2022; Malik and Tian 2017). However, their design was criticized by Jean-Christophe Plantin et al. who argued that the Facebook API eroded the foundations of the Open Web, ‘moving away from published URIs and open HTTP transactions in favor of closed apps that undertake hidden transactions with Facebook through a Facebook-controlled API’ (Plantin et al. 2018).

This issue is compounded by the fact that Twitter, Instagram and Facebook APIs severely limit access to data – even that which is public – without special permissions obtained through academic research applications (Twitter Developers 2022; Facebook Developers 2022b; Facebook Developers 2022c). These new restrictions were implemented in the aftermath of the Cambridge Analytica controversy – where data was illegitimately gathered on millions of Facebook users for political gain – and aimed to reduce the abuse of personal data (Venturini and Rogers 2019; European Parliament 2019). In the wake of the scandal, Facebook closed access to its Pages API entirely, which as Deen Freelon explained in 2018 curtailed research on the platform entirely: ‘Let me underscore the magnitude of this shift: There is currently no way to independently extract content from Facebook without violating its TOS’ (Freelon 2018). Other platforms followed suit, with some researchers welcoming this greater oversight (Tromble 2021).

However, with this new generation of APIs that were consequently released – including those of Twitter, Instagram, and Facebook – access was conditional on researchers’ aims and methods being approved by the developer team (Twitter Developers 2022). As Arianna Rossi et al. describe ‘Before obtaining access to the Twitter’s API we were compelled to describe the purpose of our research to the Twitter developers’ team, who reviewed our motivation, mission, and practices’ (Rossi et al., 2022, 183). In this way a private company is ultimately able to mediate and restrict research on their data. These restrictions have led to researchers referring to the ‘post-API age’, where there is a data scarcity (Breuer et al. 2023). This has only been compounded in recent years with the closure of Meta’s CrowdTangle platform – which had previously been used by researchers to monitor the spread of disinformation on the platform (Ortutay 2024; Facebook 2024b; UNESCO 2023).²³

²³There is hope that the successor to CrowdTangle may provide free access to data for research-

To complicate matters further, the data returned by the API exhibits new biases. Justin Chun-ting Ho analysed the results returned by the Facebook Graph API after new limitations were introduced in 2017, and found that the new restrictions had introduced a bias towards posts with high user engagement in the data (Ho 2019a). Daniel Thiele identified that when using the Facebook API, ‘the data returned sometimes exhibits gaps or skewness for unclear reasons’ and criticized that even ‘accessing the Facebook API has become more and more difficult for researchers in the past few years’ (2022, 193). Ultimately, much like the lack of clarity regarding the platforms’ use of algorithms, it is difficult for researchers to establish how the data they collect has been shaped by the practices of the platform and its API.

2.4.5 A New Type of Metric

In many ways then, the adoption of platforms across the museum sector has complicated data gathering. However, researchers are increasingly able to supplement and nuance the data and metrics provided by social media platforms through increasingly sophisticated forms of quantitative analysis. This section will outline some of the approaches that researchers can utilise – sentiment analysis, topic modelling, network analysis, and computer vision – and explores how they have been used to study the museum sector.

2.4.6 Sentiment Analysis

Sentiment analysis aims to identify the emotional tone or opinion of a given text – usually tweets, comments, or reviews (Valdivia et al. 2017; Alexander et al. 2018).²⁴ Performing this kind of analysis on the comments of museums’ online resources can summarise large amounts of audience feedback and captures more nuanced information about the reception of online content than platform metrics.

ers while upholding both privacy and new transparency standards. The European Union’s Digital Services Act (2022b), which aims to provide ‘greater democratic control and oversight over systemic platforms’, has likely contributed to the development of the ‘post-post API age’ (Mimizuka et al. 2025; European Commission 2022a). However, the full extent of the impact this will have on access and research is still unclear.

²⁴Both sentiment analysis and topic modelling originate from natural language processing – a field within computer science that focuses on understanding or generating day-to-day language. Prominent problems in the field include speech recognition, text classification, generating texts, and improving understanding natural language, such as with search queries or large language model prompts (Devlin et al. 2019; Brown et al. 2020). Innovations from this research have been widely applied in computational linguistics, computational literary studies, and increasingly on texts published by museums (Moretti 2000a; Clark et al. 2013).

It has a precedent in content analysis, which is summarised by Alan Bryman as the attempt to ‘quantify content in terms of predetermined categories and in a systematic and replicable manner’ (Bryman 2012). This previously involved the manual labelling of texts with predetermined codes, which has commonly been used in studies of the museum sector (Krippendorff 2019; Taboada 2016; Morse et al. 2022). However, sentiment analysis more usually refers to the automatic classification of texts using computational methods. For example, in Peter Turney’s seminal study, unsupervised machine learning algorithms were used to quantify the semantic orientation of reviews. They were categorised as ‘thumbs up’ if they included more positive words such as ‘excellent’, and ‘thumbs down’ if they contained a higher proportion of negatively coded words such as ‘poor’ (Turney 2001). This approach relies on ‘sentiment lexicons’, which are lists of words manually tagged as indicative of an emotion. The automatic sentiment analysis of NVivo, SentiStrength, and Linguistic Inquiry and Word Count (LIWC) – popular software widely used in research for labelling and coding texts – all rely on such lists (QSR International (Lumivero) 2024; Pennebaker Conglomerates 2025; Thelwall 2025).

There is an obvious limitation to this word-based approach, it does not take into account sarcasm, idioms, slang, or ambiguity (QSR International (Lumivero) 2025). In 2013, Elena Villaespesa analysed tweets from the ‘Art in Action’ festival at the Tate Modern and manually reviewed the assigned sentiment of a subset of the data. The automatic encoding miscategorised tweets which used words with a negative sentiment in a positive way, such as ‘The Tanks were weird to say the least but hell I liked it’, and ‘Also, the first time I’ve been pushed to real life emotional tears in years #thetanks #theartistispresent’ (Villaespesa 2013). She also highlighted that ‘automatic coding does not disclose the reason why the experience was positive or negative’ (Villaespesa 2013).

However, the introduction of more comprehensive ‘sentiment lexicons’ and nuance in labels has seen a greater granularity of sentiments researched, for example ‘bored’ or ‘confused’ (Zhou and Ye 2020; Baldoni et al. 2012). David Gerrard et al. (2017) similarly used a sentiment lexicon – in this case made up of ‘lexical units’ generated with FrameNet – to explore expressions of inspiration on museums’ social media. Working in collaboration with museum experts, they aimed to identify creative changes in audiences’ behaviour, such as trying a new activity. They found that ‘Tweet-based textual content can be quite reliably interpreted as containing expressions of inspiration’ based on the presence of these lexical units and this was confirmed by a validation dataset that was manually annotated by museums staff (Gerrard et al. 2017).

However, recent developments in neural networks have opened up new possibilities for researchers. Large language models can take into account the surrounding context of a word adding nuance to previous methods of analysis (Zhang et al. 2023),²⁵ and multimodal models are even able to perform sentiment analysis across texts and their associated images or videos (Yang et al. 2024), something that David Gerrard et al. highlight as missing in their analysis (Gerrard et al. 2017).

2.4.7 Topic Modelling

It is possible to use many of the tools designed for sentiment analysis and software to label texts with custom ‘themes’ – a term borrowed from content analysis (Villaespesa 2013; Morse et al. 2022). Manual tagging of themes is widespread in the museum sector, and many studies of sentiment analysis also explore the themes of their texts. In the aforementioned study of museum tweets, Villaespesa supplemented the sentiment analysis by grouping tweets into the most popular reoccurring topics: the architecture of the installation; programme events; a ‘comments wall’ installation; and those about the Tate gallery in general. She was then able to analyse which topics had the highest ratio of positive comments to evaluate the installations.

In many studies these themes are manually created and identified based on patterns that the researcher observes and are ultimately shaped by their research questions. However increasingly this process is semi-automated. One such example is the analysis of a controversial curatorial initiative at the Manchester Art Gallery by Maria Paula Arias (2020) where a thematic analysis was conducted using the software NVivo. This process of coding the topics requires a close reading of the texts, and she highlights how useful manual oversight was in this process as the sub categories created ‘often overlapped with one another’ (Arias 2020). These categories were then supplemented with the metadata available from Twitter and a quantitative analysis.

Many studies with the museum sector – including both the studies by Arias et al. and Villaespesa – focused on a discrete time period and a single Twitter hashtag. While the relatively small size of these datasets enables researchers to better manually code these themes, it is time intensive and limits the scope of the analysis. By using supervised and unsupervised machine learning methods researchers can automate the identification of themes within the data set reducing the amount of human time needed to perform an analysis. This automated

²⁵This is a simplification of vector embeddings, which are discussed in more detail in Section 3.11.

version of this process is more commonly referred to as topic modelling, however, the end goal of both is the same – grouping texts into overarching topics/themes based on their content. Yet, by adopting a fully automated process, it will be possible to massively increase the size of data sets. As Arvanitis et al. noted, ‘the use of more data points (e.g., both in terms of the range of events and audiences evaluated) could ensure a safer and more insightful analysis and comparison of data’ (Arvanitis et al. 2016).

There are a number of different approaches to topic modelling. These span ‘classical’ methods, such as Latent Semantic Analysis (LSA), Latent Dirichlet Allocation (LDA), and Non-Negative Matrix Factorization (NTM), as well as those based on neural networks, like Top2Vec and BERTopic (Murugaraj et al. 2025). LDA and increasingly BERTopic are the most widely used in the digital humanities so will be discussed in more detail (Weingart 2012; Liu and Anikin 2025).²⁶

A clear step-by-step explanation of ‘classical’ topic models geared towards humanists is provided by both Ted Underwood (2012) and Scott Weingart (Weingart 2011), which cumulatively explain both the theoretical basis and practical applications. I will therefore not reiterate the details of LDA here, however, the fundamentals are relatively simple. As Allen Riddell (2012) highlights in his summary of unigrams, ‘Topic models typically start with two banal assumptions’. The first, is that in a large corpus there are groups of texts (these can be referred to as themes or topics),²⁷ the second, is that within the different groups, texts will use different vocabulary (Riddell 2012). Helpfully, the inverse is equally true, words that commonly co-occur are likely to be part of the same topics.²⁸ Therefore, using the word frequency and co-occurrence of words in the given texts, is possible to calculate the probability that these texts are about the same topic using the following formula:²⁹

$$p(\text{word } w \text{ with topic } t) = p(t | d) \cdot p(w | t) \quad (2.1)$$

²⁶The limitations of these methods will be discussed at length in the methodology (Sections 3.6.2.2 and 3.11).

²⁷A note that occasionally causes confusions in discussions of topic modelling, is that in technical terms, the ‘topic’ is the collection of texts. A ‘topic’ is not a list of words, we may use such a list, but these are merely representations of the topic that we use to summarise the types of texts within it.

²⁸As a result, the most common words – referred to as stop words – such as ‘a’, ‘and’, ‘the’ have to be removed as words common to all topics can adversely affect topic assignment, while rare words also need to be removed, as they indicate the

²⁹An accessible step by step walkthrough of this calculation is provided by Ria Kulshrestha (2019) on her blog. Notably, as becomes clear in an overview of the mathematics behind topic models, these algorithms are not black boxes.

The downside of this approach is that each text in the corpus is treated as a ‘bag of words’, meaning that the order, relevant grammar, and context of a word is lost. In addition, the number of topics must be chosen beforehand by the researcher.

Both of these limitations are addressed increasingly by neural topic modelling. BERTopic, a python library developed by Maarten Grootendorst, is a widely used in the digital humanities (Grootendorst 2022; Murugaraj et al. 2025; Liu and Anikin 2025). By utilising the embedding space of a large language model – in this case, Google’s BERT (Devlin et al. 2019) – the relationship between texts or sentences can be identified (Grootendorst 2025a). Researchers are also not required to specify a set number of topics, although they can both choose a specific number of manually reduce the number of topics or merge those that appear to be similar. BERTopic is consistently found to outperform classical methods in terms of topic coherence, diversity of topics, and interpretability (Murugaraj et al. 2025). However, it is a black box model, and it is impossible to tell exactly why a given text was assigned a topic. In this case there is a trade-off between interpretability and performance. However, if contextualised and evaluated with domain expertise, this kind of topic modelling could help identify different digital strategies and how what is being discussed on social media shifted over the course of the pandemic.

Advances in technology have made training neural networks – a resource intensive task – increasingly accessible (Izsak et al. 2021; Lin et al. 2020). This, combined with the increasing use of fine-tuning and pre-training models has seen them become widespread, and the size of datasets grow. There is a potential then to run this form of topic modelling over large datasets of museums’ texts which spans multiple organisations or a long time period. In this way trends in a way that is not possible using the data from a single museum (Section 3.10), who likely have neither enough posts or interactions with them to utilise the same techniques.

2.4.8 Network Analysis

Network analysis could prove similarly useful for nuancing our understanding of content’s online reception. Visualisations commonly show nodes – which can represent anything from people to organisations or objects – and the relationships between them, which are visualised as connecting lines, here called links. It is therefore easy to highlight which nodes are in contact with whom, and various weightings can be added, and used alongside pathfinding algorithms to represent the ease of communication. Common but useful metrics focus on the centrality of nodes in the network, capturing the number of connections it has to other nodes (degree centrality), how many connections are traversed to reach all other

nodes in the network (closeness centrality), or whether a node connects nodes that otherwise would not be linked (betweenness centrality). Additional measures such as Eigenvector centrality and page rank, are more complex and take into account not only a node's connections, but the connections of those connections. Through these metrics, network analysis is a useful tool for identifying actors who facilitate collaboration or disseminate information (Ingenhoff et al. 2021).

This is widely used to explore the interconnected nature of departments (Ujwary-Gil 2019), institutions (Lis-Gutiérrez et al. 2020), artworks (Zamora-Kapoor et al. 2020), and audiences (Chang et al. 2022). Yet it is of particular interest in the museum sector as it has been found that small museums – who are usually underserved in traditional forms of analysis – are highly interconnected with surrounding local organisations, with collaborations apparently increasing over the pandemic period (Crooke 2020). Marshall and Staeheli note that 'network analysis can illustrate the ways in which some local organizations are more successful at attracting donors and positioning themselves as key intermediaries between international funding and local partners' (2015, 60). This could be a prove a helpful tool for funders by identifying organisations who are repeatedly overlooked and underfunded.

Network analysis therefore has potential to chart the way information is spread and identify the most important actors in a network and is used both within individual organisations and across entire sectors. Although Chang et al. highlight that the majority of studies in the sector present their findings 'without suggesting a plan for use in actual museums' (Chang et al. 2022).

In the museum sector, La Magnética (2014) conducted an analysis of the Twitter response to 'Ask a Curator Day', which saw them analyse 47,546 tweets posted over three days. The team used different measures of centrality to calculate Twitter users' relevance and influence in the communities participating in #AskACurator, and where possible, sections of the data illustrating key accounts in different countries were illustrated in network graphs. They note that this kind of analysis, 'over a longer period of time allow[s] us to have a deeper understanding of our museum communities. How our followers relate to us, how they relate to each other, who are the most influential users in a group, etc. And this understanding leads to a better definition of our strategy and a better way to assess our Social Media efforts' results' (La Magnética 2014).

Such information can help refine museums digital strategies by exploring the way that information is disseminated across a network. In their study of Twitter, Dimitrios Kydros and Vasiliki Vrana looked at the tweets of the top 25 museums in Europe for a two-month period in 2019 (Kydros and Vrana 2021). They were able

to identify users that facilitated exchange between international communities.³⁰ This approach provides an understanding of who information is reaching and via which avenues, enabling organisations to better adapt their digital strategies and identify potential collaborators.

Similarly, the recent work of Chang et al. explores the Instagram followers of five South Korean museums (2022). They focused on categorizing types of visitors and identified six groups – each with its own characteristics – using community extraction. Some groups were heavily orientated around a single central user – often a gallery – while others were far less centralised, with connections between users more evenly distributed amongst the group (Chang et al., 2022, 56:10).³¹ Different hashtags, subjects, and ways of disseminating information were popular in each group, enabling organisations to create content that better targets different types of users. Chang et al. highlights the benefits these computational methods have over traditional approaches; ‘visitor analysis on SNS [Social Networking Services] can be continuously updated after it has been designed, unlike an interview or observational survey that must be conducted individually and is time-consuming’ (Chang et al., 2022, 56:16). Conducted on a large scale may require a collaborative effort and the backing of larger GLAM organisations and research institutions, but it is possible that the sector may be able to develop sustainable evaluative tools that better capture online audience engagement.

2.4.9 Computer Vision

Of course, not all information on the internet is text, and it would be remiss to ignore the tools available for the analysis of images. Computer vision is the primary method for analysing images at scale – or ‘distant viewing’ (Arnold and Tilton 2019).³² Tasks often include, detecting objects within an image, optical character recognition, pose estimation, image restoration, and detecting similarity between images (Nilsson 2009; Browning and Schmitt 2021). It is the last of these, that has been most talked about in relation to museums. Integrating computer vision into

³⁰Notably for discussion of personal privacy, they identified that 34% of the 30 most important users were official museum accounts, and six nodes (20%) were ‘plain persons’ (Vrana et al., 2019, 581). This highlights the blurred boundary on social media between personal and public, which presents a unique ethical challenge for researchers using social media data. This is discussed in depth in Section 3.9.1.

³¹It is important to note that this approach requires extensive data gathering on audiences. The perils of this are discussed in the methodology (p. 103).

³²This represents the adaptation of ‘distant reading’, a term coined by Franco Moretti (2000a). A full description of the theoretical basis of this thesis, including ‘distant reading’, is provided at the beginning of the methodology (Section 3.1.1).

the search of online collections would enable visitors to explore in entirely new ways (Villaespesa and French 2019).

As Lev Manovich describes museums' collections search – as they have traditionally been implemented – poses a barrier to new users, 'its deep assumption... is that you know beforehand something about the collection worth exploring further' (Manovich, 2011, 21). Navigating through a collection based on the qualities of an image – colour, the object depicted, style – enables users to bypass the hierarchical categories embedded in museums catalogues. Navigating through this kind of pattern recognition, Manovich argues, is more in line with how people navigate physical scenes. Improving and diversifying the way users navigate online collections is of increasing concern as they grow in scale. Initiatives such as Art UK's online collections platform and Europeana, host millions of images, compounding issues around discoverability (Humbel et al. 2025).

Embedding computer vision features in these experiences requires a high level of technical expertise, and Google has consistently led the field. In 2018, Google launched 'Art Selfie', an app to which users are encouraged to upload selfies (Luo 2018). Using machine learning, the app then identifies similar matches within the Google Arts and Culture Collection. In 2020, Google Arts and Culture released another computer vision feature that enabled users to search for images based on their colour (Google 2021). However, in 2025, the use of computer visions within museums is still a rarity, as the resources and expertise needed to train and develop applications exceeds those of most museums their use has been limited to the largest national museums (Villaespesa and Murphy 2021).

The UK's Science Museum has tested the use of neural networks as part of the Congruence Engine Project (Wilson 2023). This project highlighted the many inaccuracies of the models, which has led to hesitation to expand their use in the near future. However, the project highlighted the potential for a new form of navigation where 'one can look at relationships and connections in terms of degrees of similarity, as for example is used in online bookselling sites: "If you like that book, you might like this one"' (Unwin and Stack 2023). This envisaged version – and its similarity metric – would function similarly to the recommendation algorithms found on current commerce sites and social media platforms.

Identifying similarity between images, is of significant interest for both researchers of cultural collections and the public. Sabine Lang and Björn Ommer (2018) highlighted the utility of computer vision to support the comparison of images and highlight iconographic similarities, helping users navigate across vast datasets.³³

³³One of the main barriers to this kind of work is the amorphous definition of 'similarity' in this

The utility of multi-modal models – whose training data includes multiple forms of media e.g. text and image – even raise the potential of searching for visual attributes using text prompts (Wu et al. 2024; Wu and Xie 2024). However, the use of black box algorithms to identify similarity between images raises a number of issues for researchers. These will be explored in depth in Section 3.11 of the methodology, which identifies the limitations this introduces to this research, and how they might be addressed.

2.5 Recent Research

2.5.1 Recent Research on Museums' Use of Platforms

These tools have become increasingly more accessible, and – alongside basic statistics – have been used to help chart how museums have responded to the pandemic. The work of Jenny Kidd et al. (2022) provides a fascinating insight into the early weeks of the first lockdown. The study brings three approaches – the quantitative analysis of 9,000 tweets, the qualitative analysis of a small sample of 450 tweets, alongside 19 interviews – to explore how institutional attitudes towards social media had shifted over the course of the pandemic. The tweets were drawn from two hashtags, #CultureInQuarantine and #MuseumAtHome, between March and May of 2020.³⁴ Using this mixed methodology, they were able to identify two distinct phases – a ‘reactive’ phase, which saw a high demand for the digital, and a second ‘tactical’ phase that focused more on building meaningful connections and generating a dialogue with online visitors. This was informed by the analysis of 450 tweets (a 5% random sample) using NVivo, which identified that 73% had a ‘promotional’ tone.³⁵ 48% did however, solicit engagement,

context. It is entirely unclear whether it refers to colour, form, shapes (Lang and Ommer 2018; Guhenec and Charlesworth 2024). As the use of computer vision for cultural analysis of collections is outside of the scope of this thesis, the many debates surrounding digital art history have not been discussed. However, development of the field and the challenges it faces, has been aptly summarised Amanda Wasielewski and Anna Näslund (2024). This reflects on the significant criticism of the field for its flattening of cultural data, which has only been exacerbated by different terminologies and research priorities between engineers and humanities researchers (Guhennec and Charlesworth 2024; Drucker 2013).

³⁴They note that this choice of hashtags similarly, ‘shaped the data in profound ways’, and that it is not representative of the wider public use of Twitter – or the whole museum sector (Kidd et al. 2022).

³⁵This sample was labelled with: ‘(1) the tone of each tweet (the type of expression or emotional register), (2) the theme or themes, (3) the types of content and how they interacted, (4) additional hashtags being utilised, (5) the presence of hybrid approaches, and (6) the values being recognised or debated’ (Kidd et al. 2022). Advances in the sophistication of sentiment analysis and topic modelling have enabled the automation – although not perfect – of these elements, with the exception of 3 and 6.

while 23% contained a call to action – such as a request to like, play, buy, or follow (Kidd et al. 2022).³⁶

This is particularly interesting, as despite this focus on promotion and marketing, the interviewed practitioners felt positively about the dialogue they were creating and a tonal shift away from the ‘corporate’ (Kidd et al. 2022). This is where additional contextual data predating the pandemic could help indicate whether 73% was actually a reduction in the proportion of tweets that focused on promotion – a mode of communication that prioritises dissemination over dialogue and depth of engagement.

It is only through conducting both quantitative and qualitative analysis that this kind of discrepancy between lived experience and the data emerges. It also has the benefit of nuancing the metrics provided by the social media platform. While the researches had conducted interviews to nuance their understanding of the study’s quantitative findings, the social media managers they interviewed also found qualitative data ‘helpful in interrogating those metrics and articulating the more subtle or expansive ways in which engagement functions’ (Kidd et al. 2022).

Many of the earlier quantitative studies regarding museums in the pandemic similarly focused on the first few months. Ellie King produced an analysis of exhibitions between March and June of 2020. Using convenience sampling – taking the most visited museums in the UK and googling museums in specific regions and cities to provide a broader coverage – the study identifies 88 temporary exhibitions planned for the spring of 2020 (King et al. 2021). These were manually identified, categorised, and analysed to explore how museums adapted to the pandemic. Only 21 of these exhibitions had an online element, with the majority appearing on museums websites – only 3 were posted on social media. King identifies an interesting lag between lockdown restrictions and online content appearing.

There is a slight spike in postponed exhibitions in May, during a time of lockdown when there was great uncertainty with regard to how long museums would remain closed... However, there is also an interesting rise of museums providing online content in the later months of lockdown of May and June, suggesting that time was used to prepare the transfer of exhibitions online. (King et al., 2021, 491-492)

³⁶One of the downsides of discussing raw numbers – which is equally applicable to some of the research in this thesis – is that the digital strategies of frequent posters can skew the data. For example, the most prolific accounts can post 10 times more than their counterparts – and therefore if they choose to engage with

Ultimately, online exhibitions were only hosted by a small minority of museums – with virtual galleries and 3D experiences being even rarer (King et al. 2021).³⁷

Another such example is from Italy, where a number of quantitative studies have emerged, in part helped by the launch of the ‘Three-year plan for a digital and innovative museums’ by the Ministry for Cultural Heritage and Tourism (Agostino et al. 2020; Arnaboldi and Diaz Lema 2021).³⁸ This initiative saw the development of a dashboard which real-time monitoring of the online reviews, museums’ activity on social media, and social media engagement for the 100 most visited museums state museums in the country (Agostino et al. 2020; Vito et al. 2017; Candrea et al. 2025). Agostino et al. 2020 supplemented this data with the average number of daily posts from the museum, average number of interactions on a post, and the number of followers. They found that there was a significant increase in the activity of museums online in mid-April, with museums posting more to Facebook, Twitter, and Instagram. They identified that ‘museums gathered a significant number of new followers’ in the first pandemic period, although the average interactions per post only increased by a small level, dropping in the case of Instagram (Agostino et al., 2020, 367-368).

Later in 2021, the same researchers produced a follow-up paper that succinctly summarised these findings: ‘Museums posted more on all three main social media channels – up by 20% on Facebook, and more than doubling on Instagram and Twitter. Their posts, however, were less engaging compared to before the pandemic, despite their greater online following’ (Agostino et al. 2021). This second paper focuses on the challenges facing museums, and highlights that ‘[museums’] approach is mainly top-down, they “look within” and then tell the outside world... Museums were not analysing what users say or prefer in a bottom-up logic that is closer to the process of co-creating value’ (Agostino et al. 2021). This paper was followed by a third on a small selection of 10 state archaeology museums from the same dataset.

In a similar vein to the other studies by King and Kidd et al., Agostino et al. (2020) were reliant on preexisting dataset. They focused on the top 100 most visited Italian museums specifically because they were already being monitored by the Ministry for Cultural Heritage and Tourism. Yet, it was not representative sample of the

³⁷King also performed sentiment analysis – manually tagging exhibition text using the software NVivo. King concluded that online exhibitions had been used to reinforced museums’ ‘role as an outlet of hope and community’, and highlighted the hopeful outlook that many of texts represented (King et al. 2021).

³⁸Interestingly, this data collection was motivated by the conceptualisation of museums as a major component of the tourist industry, and was begun to explore how visitor numbers could be increased through digital means. Much like in the UK, there is a correlation between the rise of economic instrumentalism and the quantification of the cultural sector (p. 26).

Italian museum sector, ‘63 of the 100 museums are situated in a provincial capital and 21% of these are in Rome’ (Agostino et al., 2020, 365). With a concentration in the capital and focus on state-run museums, these institutions are likely to be larger and better resourced than the average museum in Italy. Data availability is a reoccurring issue for researchers. In an attempt to analyse the online offerings of 10 small and medium sized Italian institutions, Giuseppe Vito et al. found that the ‘main obstacle to pursuing such research is in the data’ (2017, 1075).

2.5.2 The Introduction of Bias

It is unsurprisingly then, that many turn to convenience sampling and pre-existing datasets (King et al. 2021). While choosing samples that align with pre-existing datasets enables researchers to contextualise and understand the new data more easily, replicating previous sampling choices perpetuates existing biases. This is an issue that is exacerbated by digital technologies. When using Google results, social media, or review sites for analysis, many researchers rely on the top results, or the popular accounts (King et al. 2021; Zafiroopoulos et al. 2015). These are easy to identify and therefore make data collection significantly easier.

Data availability was a major consideration in a number of the recent works and influences how studies are designed. In Kydros and Vrana’s analysis of European museums Twitter (2021), they use the top 25 accounts across Europe, as were ranked on TripAdvisor in 2018 – including the Musée d’Orsay, the Hermitage, the Rijksmuseum, and the UK’s National Gallery (TripAdvisor 2019). The majority are national institutions with large visitor bases and are far from an even spread across Europe, with the UK and Ireland having seven entries, and Italy five. They therefore have more in common with each other than small volunteer-run museums that are located within the same country.

A more recent example is a study of museum Tweets by Lorella Cannavacciuolo et al. (2024), which analysed 334,505 tweets from 89 museums. Their dataset was built on the list published in the Arts Newspaper of ‘2018’s Most Visited Shows and Museums’ (Cannavacciuolo et al. 2024). They identify a declining use of Twitter amongst museums between 2016 to 2022 and explore word frequencies, categorise the top most frequently used words, and how they change over time – most notably with use of the word ‘home’ soaring in 2020, and an increase in use of terminology around digital technologies (Cannavacciuolo et al., 2024, 13-14). This focus on ‘the most important’ museums, reflect a prioritisation of visitor numbers and ease of data collecting that flattens the many nuances of

visitor engagement and diversity within the sector (Cannavacciuolo et al. 2024).³⁹

Twitter, which was the focus of both these studies, is disproportionately used within research exactly because it is one of the easier social media platforms to gather data from. Despite the fact that Facebook is a more popular platform amongst museums (Larkin et al. 2023), a recent study by Kidd et al. (2022) chose to analyse data from Twitter because, ‘Acquiring a dataset was also more straightforward for Twitter than it would have been for other sites such as Instagram or Facebook.’ (Kidd et al. 2022). This highlights once again just how influential the decisions of large corporations are on the direction research.

Yet, the biases that data availability introduce are not unique to quantitative methods. Case studies and surveys had disproportionately focused on the innovative projects ‘major institutions’ or ‘superstar’ museums (Gombault and Allal-Chérif 2021; Samaroudi et al. 2020; Gladysheva et al. 2014). Heralded as sites of innovation, large museums disproportionately shape the perception of online museum experiences in academia both in the UK and across Europe (Camarero et al. 2016; Zafiroopoulos et al. 2015). This is an issue similarly found in surveys, at both an institutional and individual level, as return rates are often poor (Chaplin et al. 2023; Dickenson 1992). A self-selection bias in respondents distorts our understanding of the sector, leading to the experiences of well-resourced and larger museums – those who have the capacity to engage with research efforts – dominating discussions (Nuccio and Bertacchini 2021; Gran et al. 2019; Bethlehem 2010).⁴⁰

Fiona Candlin et al. (2019) worked towards addressing the absence of smaller and unaccredited museums in datasets, highlighting that although small organisations made up 54% of UK accredited museums in 2017 and 85% of the estimated number of unaccredited institutions, this majority is largely ignored in discussions of sector trends (Candlin et al. 2019). This work has proved foundational for this research and a collaboration with the team has developed over the last few years. As such, the design of the data is discussed at length in the methodology (Section 3.2.1).⁴¹

³⁹The quote in full is ‘This paper makes some potentially crucial contributions to the literature in identifying new evidence in the use of social media, such as Twitter (now X), by the most important museum in the words’ (Cannavacciuolo et al. 2024).

⁴⁰This is particularly relevant when expanding beyond institutional participants to measure audience engagement. Reaching individuals who do not visit museums at all has been a reoccurring issue with audience surveys, as there is no established route through which museums can contact them (Kirchberg 1996).

⁴¹The Mapping Museums Project is not the only attempt to create a representative dataset, although it is both the most recent, and the largest in the UK. There is, however, a precedent in Fletcher and Lee’s survey of 315 American museum professionals. Despite being conducted over a decade ago, it draws from a wide pool of museums: ‘The average annual attendance was approximately 684,000 with a range between 200 and 4.5 million, with 59 percent having annual

The database of over 4,000 UK museums the project generated over the duration of the Mapping Museums Project has been used to chart the way the sector has changed since the 1960s (Birkbeck Knowledge Lab 2021). It represents the most comprehensive list of museums in the UK and extends beyond accredited and national institutions to look at the wider sector. As such, it is able to capture what is happening to smaller unaccredited institutions, which are poorly documented in the current literature (Ballatore and Candlin 2023).

This valuable resource has recently inspired the Museum Closure Project, which explores the increasing number of museum closures since 2000 (Mapping Museums Lab 2025). As access to government funding across the sector varies widely (Winchester 2024; Atkinson 2024), it is only by including these smaller institutions that it is possible to chart the real impact of policy, funding cuts, and of course, the pandemic which appears to have caused the rate of museum closures to rise. 16 museums closed in January 2024 to 2025 alone, but the majority were small organisations (Liebenrood 2025).

2.6 Post-pandemic Recovery

2.6.1 Low Visitor Numbers

The rate of museum closure has become a primary point of concern for the sector. In 2020, UNESCO estimated that up to 13% of museums would close permanently in the face of the lockdowns and consequent loss of revenue (UN News 2020). In 2025, a survey in the UK found that three in five small museums fear closure, in part due to low visitor numbers (Ware 2025). Alison Bowyers noted that ‘visitor numbers are still 8% lower than pre-pandemic levels. The smallest museums and museums outside London, particularly in the North and Midlands, are the furthest away from achieving pre-pandemic numbers’ (Ware 2025). While an Arts Council survey (2025) of 1,200 museums highlights that annual visits have dropped by 10% since 2019, while overall expenditure has risen (Arts Council England and PS Research, 2025, 5).

The cost of living crisis – which has seen the average income in the UK drop and the cost of services, food, and fuel rise (Office for National Statistics 2025; attendance of 100,000 or less’ (Fletcher and Lee 2012). This is a more varied sample than the other survey and studies discussed within this literature review and has contributed to the robustness of the Fletcher and Lee’s findings, which anticipate many of the trends identified within this research in a way more contemporary research does not. However, it should be noted that the average annual attendance reported here is a mean. In the presence of such extreme outliers, the median – which here would be less than 100,000 annual visitors – would give a better sense of the average within the sample.

Francis-Devine et al. 2024) – appears to have contributed to museums falling revenue. Spending on non-essential goods has fallen, which may have contributed to the low visitor numbers – even amongst free museums – as visitors are unable to cover the cost of transport, food, and other miscellaneous expenses accrued on a day out (Harari et al. 2024). This context may partially explain why the UK museums are failing to recover at the same speed as their European counterparts.

2.6.2 Spending Cuts

However, it is also likely exacerbated by differences in government spending. As previously mentioned the UK government spends proportionally less on the arts than the vast majority of EU countries (Ashton et al. 2024). While in 2024 the government pledged funding for the arts – a 2.6% growth in real terms (Winchester 2024) – a year later the budget for the Department for Culture, Media and Sport (DCMS) was again cut following a spending review (Harris 2025). To further complicate matters, the funded schemes have different eligibility criteria, with a focus being placed on national museums. Arguably this has only exacerbated the disparity in the sector. Sharon Heal, director of the Museums Association, highlights that ‘we are extremely disappointed that the urgent needs of local and regional museums and galleries have not been addressed in this budget’ (Winchester 2024; Atkinson 2024). The Art Fund similarly released a statement highlighting this issue, while it was a ‘welcome increase in investment for National museums and galleries... [the budget] did little to address the urgent crisis facing civic museums’ (Bird 2024).

The role of local authorities and the museums reliant on them were increasingly prominent in new coverage after a drop in funding from central government.⁴² Alison Bowyers argued that ‘Local authority funding is a huge issue for a large number of smaller museums... As well as continuing to invest, local authorities can support smaller museums in other ways such as marketing, advocacy, transport and accessibility. Small changes can make a big difference’ (Ware 2025). Similarly, the Museum Closure Project found that of the 16 museums they found had closed between January 2024 and January 2025 – that’s a quarter – were directly attributed to cuts in local authority funding (Liebenrood 2025).

⁴²In the UK, local authorities are a form of local government responsible for delivering a range of services including social care, housing, and waste collection in a specific region. They predominantly receive funding through council tax, business rates, and government grants (Local Government Association 2022).

2.6.3 A Staffing Crisis

In a parallel to the increasing inequality in households, it is the most financially vulnerable museums – run by local authorities – who have borne the brunt of both spending cuts and the reduction in visitor numbers. Heal highlights how new measures present unique challenges for civic museums.

Local museums were already facing the brutal realities of redundancies, site closures, reduced public access and for some the threat of sale of collections or insolvency...

And while we welcome measures to support the lowest-paid workers through increases to the minimum wage and national insurance contributions, we know this will put pressure on already over-stretched budgets and will mean many civic museums will be worse off after the budget. (Atkinson 2024)

Staffing remains a challenge for museums. Jobs within museums were particularly vulnerable during the Covid-19 closures compared to the wider arts sector (McCallion 2020). PAYE zero hours contracts and agency workers – who form a large proportion of the UK cultural workforce – were not covered by the job retention scheme which paid 80% of employees salary (Bradbury et al. 2021). Yet, these individuals were also not covered by the Self-employment Income Support Scheme, as many relied on both self-employment and short-term contracts (McCallion 2020). It is these jobs that were worst affected by the pandemic, which – as the Audience Agency’s cultural participation monitor identified – are more likely to be held by younger workers, people with disabilities, people from ethnically diverse background, and women, resulting in a drop in diversity in the workforce (Creative Industries Policy and Evidence Centre (PEC) et al. 2021; Walmsley et al. 2022). Unfortunately, the reliance on short-term contracts has only become more prevalent since the pandemic. The Arts Council found that while staffing numbers have remained stagnant since 2020, the percentage of these that are contract hires have increased (as has levels of expenditure on staffing) (Arts Council England and PS Research 2025).

2.6.4 A Lack of Expertise

This reliance on short-term contracts has a tangible impact on museums’ digital adoption. The need for digital skills in the museum sector has grown significantly over the past decade and continues to rise (Šveb Dragija 2024; Kasiola and

Metaxas 2023; Giannini and Bowen 2019). Museums have been struggling to retain staff, with more junior staff having a particularly high turnover (Walmsley et al. 2022; Šveb Dragija 2024). Regardless of the growing need for digital skills, digital positions are often junior roles. The result is that digital teams often have high turnover rates within museums, especially compared to their curatorial counterparts (Dragouni and McCarthy 2021). Therefore staff who have received digital training or developed digital skills regularly leave museum organisations, exacerbating the lack of digital expertise in the sector (Šveb Dragija 2024). In this context, much of the work done by outreach and digital teams is simply not preserved, and learning is lost when an individual leaves their role (Massingham 2018; Jung 2016).⁴³ Considering the prevalent project-based funding model for museums, there is little incentive to highlighting failed initiatives even if it would provide a useful resource for others (Sharp and Summers 2025).⁴⁴ This inability to acknowledge failure has been critiqued by Leila Jancovich and David Stevenson (2023), who note the dissonance between the widespread stories of success around cultural participation and the sector's inability to enact change in their book *Failures in Cultural Participation*.

This lack of digital expertise is the primary contributing factor to museums lack of digital adoption. While equipment can be costly, the expertise has proven a far more pervasive barrier to digital adoption. Many people today carry advanced camera with editing capabilities in their pocket. Writing in 2020, Nigel Taylor-Jones (2020) notes that 'My Samsung A40 smartphone has a brilliant camera', he found that rather than equipment being the primary barrier to filming videos for social media, it was his technical knowledge, such as '[learning] how to email large files using a Google Drive'. Nicola Euston similarly highlighted that 'all of the content [uploaded during the pandemic] has been produced without any budget. This has been a challenge as we initially thought that we would need better equipment and software but the team overcame this by sourcing free software that we could use' (Euston 2020). Yet this highlights the crux of the issue for many museums. There is a lot of open source and free software available but understanding

⁴³As discussed at length in interviews, digital responsibilities regularly fall to junior staff (p. 212). It has been found the more junior staff within museums – the most racially diverse and gender balanced of any group of employees – were the most likely to lose their jobs as a consequence of fiscal cuts, including those necessitated by the pandemic (The Audience Agency 2021). The likelihood of digital staff leaving, is likely to exacerbate issues of institutional memory and inhibit building digital expertise within museums.

⁴⁴The fact that there are often limits to what museums are able – or willing – to share exacerbates this issue. Some resources are locked behind pay walls (Candlin and Poulouvassilis 2020), but the vast majority of internal evaluation within museums goes unpublished. The Data in Museum Initiatives showcases the limitations of what can be shared. Despite the fact that the document is report to showcase the utility of data in museums, the case studies have been generalised, and dashboard screenshots use fictional data (Sue Davies 2023).

what to use and how to implement it requires a certain level of digital expertise. It is often this that defines whether a museum is able to get online, not the access to the technology itself. As Euston explained when encouraging museums to develop a virtual presence during the pandemic: 'Find out what skills your team have and provide opportunities to utilise these skills' (Euston 2020). If the team has no digital skills they were disadvantaged, especially during the pandemic when these skills were in such high demand (Šveb Dragija 2024).

2.6.5 A 'New Normal'

Considering the deep-rooted financial hardships, lack of institutional memory, and a loss of digital skills, it is unsurprising that predictions of significant digital change appear to have been optimistic. In 2020, Darren Henley captured the wider sense that things would be different when museums reopened, 'none of us will be returning to the pre-pandemic world' (Henley 2020). There was, as Ellie King describes, 'a rising atmosphere of change on the horizon' (King et al. 2021), and it was seen by many as the opportunity to create and implement a new vision for the sector (Fraser 2019). Yet with this potential for change, came uncertainty, and it was unclear what 'the new normal for culture' – as phrased by Agostino et al. – would be (Agostino et al. 2020).

Yet in 2025, the new normal bares a remarkable resemblance to the old. Likely, not through a lack of motivation or desire, but a lack of resources in the post-pandemic cultural landscape.⁴⁵ The rest of this thesis will explore this hypothesis in depth. Exploring how museums changed their practices during the pandemic, and how they changed again once museums reopened their doors. It will combine the literature highlighted in this chapter with the results of a wide-ranging analysis, to give a comprehensive overview of the UK museum sector. And ultimately ask, how museums can better use online technologies to achieve their educational, financial, and outreach goals.

⁴⁵One of the unexpected upsides of this stagnation is that many of the findings of this research, despite it spanning a number of years, are still of relevance today.

Chapter 3

Methodology

3.1 Overview

The methodology will detail the interdisciplinary approach of the research which borrows from the digital humanities, computer science, and the social sciences. While interviews and other qualitative research methods provide vital insights into museums online experience, their usefulness is often hampered by the self-selection bias of participants and their small size. Therefore, this methodology will combine these qualitative research methods with tools from computer science – including web scraping, machine learning, and large-scale data analysis – to create a comprehensive but nuanced understanding of museums’ online content.

The methodology begins with a broad consideration of the thesis’ theoretical foundations and research design. It then presents an overview of the origins and format of the data, before detailing the six individual studies:

1. Pilot Study
2. YouTube Study
3. YouTube Case Study
4. Population Study
5. Website Study
6. Interviews

The studies represent a mix of quantitative and qualitative approaches that were designed to work in concert, nuancing our understanding of the museum sector

– from the very largest national museums to volunteer run organisations. To clarify the decision-making logic behind the design of each study, they have been presented in chronological order to highlight the benefits of the iterative process. The sole exception to this is study six – the interviews – which were conducted alongside the other studies over the course of two years. By presenting the studies in this way, the methods and limitations of each are presented in their relevant context.⁴⁶

This is then followed by a section dedicated to broader discussions with cross study relevance, including the ethical considerations and a critical reflection on the use of neural networks within the digital humanities.

3.1.1 Theoretical Basis

This combination of quantitative and qualitative approaches was taken as the prevalence of social media platforms means that, even amongst the least digitally adept museums, there is enormous variety in museums’ digital publishing practices. While case studies can provide an insight into the advantages and difficulties of an individual publishing strategy, it is difficult to extrapolate wider sector trends from a handful of examples. With limited options and already overstretched digital teams, digital surveys have proven a popular and inexpensive way for museums to measure engagement online but are still skewed by towards larger institutions the self-selection bias of respondents (Nuccio and Bertacchini 2021; Gran et al. 2019; Bethlehem 2010).

A large-scale quantitative analysis of the sector presents a more representative view than these approaches, capturing small museums and nuances across the country. The ability to automate gathering data – or ‘scrape’ it – from websites, in conjunction with accessing the data collected by Meta and Google through their application programming interfaces (APIs) provides vast quantities of information. This has enabled researchers to begin more complex forms of analysis using machine learning and AI and identify broader trends in the sector, through a ‘distant reading’ of museums’ texts (Underwood 2016; Gooding et al. 2013; Moretti 2000a).

Franco Moretti coined the term ‘distant reading’ in 2000 to describe a new computational approach to literary analysis that used statistical and computational methods to look beyond the established canon, focusing on ‘the other 99.5 per-

⁴⁶A high-level reflection on the limitations of this thesis is also presented in the concluding chapter (p. 260)

cent’ of texts (Moretti, 2000b, 207; Moretti 2000a).⁴⁷ He argues that by looking beyond individual texts, it is possible to gain new knowledge of systems – such as topics, themes, and trends – at the expense of some of the complexity and richness an in-depth ‘close reading’ of an individual text can provide (Moretti 2000b; Bode 2018). However, as Moretti argued, ‘if we want to understand the system in its entirety, we must accept losing something’ (Moretti, 2000a, 54). Like any tool, the results it produces can be severely limited by unrepresentative sampling or through poor application (Da 2019).⁴⁸ Ultimately, at its best, such an approach is able to describe trends, but it does not necessarily provide an explanation as to why they have occurred.

This kind of insight requires additional contextual information provided by experts in a field. I have therefore combined data-led research with interviews to help explain the trends in the data and investigate why they are occurring. It is only through these interviews that it becomes possible to understand the organisational pressures that have shaped museums’ digital strategies and understand their decision-making process. As such, this chapter methodology heavily on the field of mixed methods research – combining both qualitative and quantitative approaches (Plano Clark and Creswell 2009). As John Creswell and Vicki Plano Clark describe, ‘while the researcher draws inferences from the analysis of both quantitative and qualitative data in a mixed methods study, additional inferences or insights, metainferences – result from conclusions learned from the integration of the two databases’ (Creswell and Plano Clark, 2023, 25). These ‘metainferences’ go beyond what would be possible from adopting a single method

Much early literature in the field was concerned with establishing philosophical foundations for mixed methods research (Creswell and Plano Clark, 2023, 24). As such, many handbooks explore both ‘methodology and methods’ – tackling both the philosophical assumptions inherent to each approach and difficulties in its implementation (Plano Clark and Creswell, 2009, 305). However, the discussions around various ‘paradigms’ in the field are, as David Morgan (2007) highlights, rife with confusion. He references the long-running conflation of different definitions– spanning ‘worldviews’, ‘epistemological stances’, ‘shared beliefs in a research field’, and ‘model examples’ (Morgan, 2007, 50-51). Creswell offers a different taxonomy of paradigms; ‘beliefs about ontology (the nature of reality),

⁴⁷It should be noted that while Moretti’s work has been influential within the digital humanities, tools, a number of methods for the statistical analysis of text have also emerged from corpus linguistics, library science, and computer science – especially natural language processing.

⁴⁸Moretti’s own work has been criticised for the exclusion of languages other than English. Jonathan Arac noted ‘the unavowed imperialism of English’ inherent in his work, which he argues pushes a ‘monolingual master scheme’ – drawing a sharp contrast to Edward Said’s centring of the idiosyncratic and particular (Arac, 2002, 44).

epistemology (what counts as knowledge and how knowledge claims are justified), axiology (the role of values in research), and methodology (the process of research)' (Creswell, 2013, 20). This debate is too expansive to include in its entirety within this thesis but has informed my approach. Within the literature review, I have tried to establish the underlying values, motivations, interpretative frameworks, and worldview that has informed the use of metrics within the museum sector.

In this thesis, quantitative and qualitative methods were conducted in tandem, enabling the preliminary results of each approach to inform the other (Creswell et al. 2003).

3.1.2 Research Design

Throughout this research, an iterative research design was adopted. Within this framework, the initial approach is regularly modified as researchers follow a cycle of planning, execution, analysis, and reflection. It has been successfully applied across many disciplines and a plethora of methodologies, facilitating a flexibility within long-term projects that enables researchers to adapt their methods to new information, methodological obstacles, and a rapidly changing research landscape (Pérez Bentancur and Tiscornia 2024; Kapiszewski et al. 2022). Crucially, this iterative approach embeds regular evaluation and learning within the research process. As Morse et al. (2002) argue, the establishment of reliability and validity should be done throughout the process so that threats to rigour and trust are identified before it is too late to correct.

Figure 3.1 details the stages of the cycle as they were applied to this thesis. There were six cycles conducted over the course of four years, although the results from the first preliminary tests and interview are not included in the thesis due to the discontinuation of key tools, and a change in interview design. The other cycles broadly correlate with the studies in this chapter, with the exceptions being the two YouTube studies – which were combined – and the Population Study, which was split over two cycles.

As will be discussed throughout this methodology, the sampling choices (pp. 71, 80) and methods (p. 75) were adapted after the first studies resulted in an improved understanding of the data. The benefits of this iterative design were shown in the Pilot Study, where the limitations of the sample were then addressed in the next research cycle (see Section 3.3.3.1).

The interviews here also played a vital part in verifying and evaluating the data analysis, feeding back into this iterative process. In addition to highlighting the

range of lived experiences of the pandemic, they provided explanations for why the results looked the way they did and were able to elucidate the organisational thinking behind different digital strategies. Most usefully, they also drew attention to smaller trends — for example, the unique digital strategies of smaller Scottish museums (pp. 160, 226) — that may not have initially been flagged in the larger datasets.

The rest of the methodology will explore the iterative cycles in more detail. First the key data sources and variables will be explored, before each study is described individually. This was done to give space to describe the decision-making process behind the methodology of each study in depth and showcase how each builds on the developments of the last. Each study includes an introduction to its aims, the data collection methods used, and a detailed description of the analysis. The final sections of the methodology will then conclude with more general reflections that span the entire project (Sections 3.9 to 3.11).

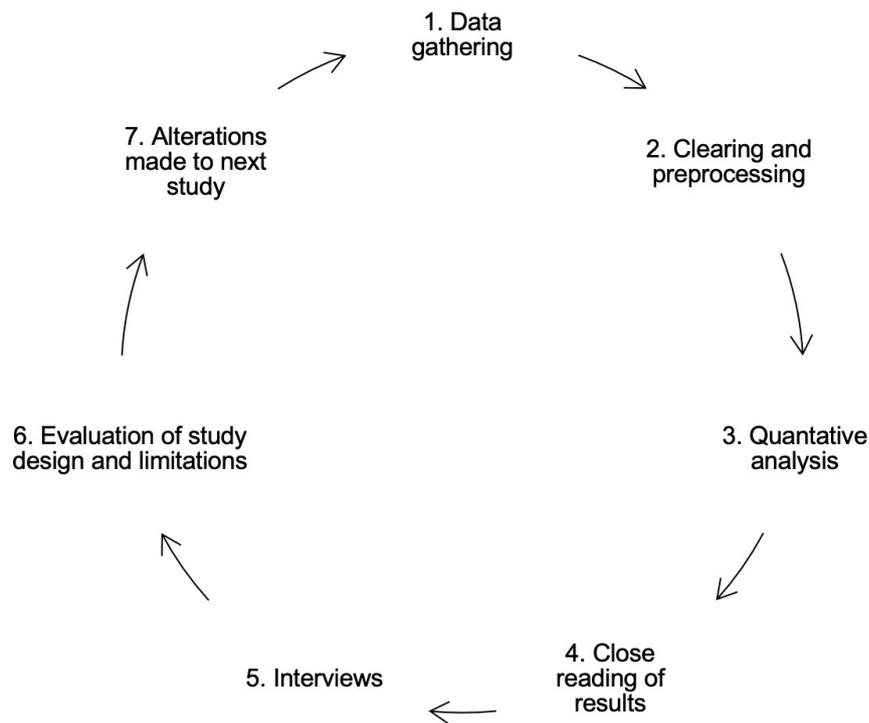


Figure 3.1: The research cycle.

3.2 Data

3.2.1 Sources

Over the course of this research, I have developed a pipeline for generating a list of cultural heritage organisations across the UK and gathering their website URLs – and consequently their social media handles – using the review site TripAdvisor (Sections 3.6.1 and 3.7.1). While the data collection process does not require an existing list of museums, pre-existing data provided two primary benefits: I was able to use it to validate the generated dataset, looking at accuracy rates and where the pipeline needed refining; and these lists were able to provide additional supplementary data, such as the organisation’s type of governance.

There are therefore two pre-existing datasets that proved enormously helpful to this research and have been used across each of the six studies. The first is the list of over 1,700 accredited UK museums (Arts Council England 2023). The accreditation scheme, while digitally hosted on the Arts Council England website, is managed in partnership with Museums Galleries Scotland, the Northern Ireland Museums Council, and the Welsh Government (Arts Council England 2024). It is government funded – much like the Arts Council itself – and opens up new opportunities to participating museums (Arts Council England 2019). As a result, the accreditation scheme reflects the economic and social justifications for government expenditure in the arts, as in addition to preserving and caring for their collections and financial transparency, accredited museums must demonstrate a commitment to public access and education (Arts Council England 2018). The documentation required is extensive, and the majority of museums in the UK are not part of the scheme (Ballatore and Candlin 2023).

The other dataset, collected by the Mapping Museums Project team at Birkbeck and King’s College London, addresses some of the shortfalls of the list of accredited museums. Collated over the course of three years and human validated, it is far more comprehensive list of over 4,000 museums, 3,300 of which remain open (Candlin and Larkin 2020; Ballatore and Candlin 2023; Larkin et al. 2023). The creation of this dataset, and the way it brings together and validates data from 18 different sources is described at length in the dataset paper and associated webpage (Alexandra et al. 2021; Poulouvassilis et al. 2021). The key components that unique to the Mapping Museums dataset, are more detailed location information, a geodemographic descriptor, and the predicted size of the organisation. This is calculated based annual visitor numbers: ‘small (0–10,000 visits); medium (10,001–50,000 visits); large (50,001 to one million visits); and huge (over one

million visits)' (Candlin et al., 2019, 57).

Together, these two datasets were integral to the development of the data collection pipeline, and Figure 3.2 highlights how each dataset reinforced the other, showing the overlap in metadata fields.

3.2.2 An Overview of the Variables

This section will explore the data in more detail, explaining key variables and providing an overview of terms that will be used throughout the following chapters. Expanding upon Section 3.2.1, the explanation of the data has been split into three categories: museum data, social media data, and website data.

Museum Data

The first of these categories includes both the data from the list of accredited museums, and the Mapping Museums dataset (Figure 3.2). As the latter forms a key part of this research, I will draw heavily from the detailed description of how the variables are defined in the *Mapping Museums 1960–2020: A report on the data* (Candlin et al. 2020).⁴⁹

For this thesis there are five variables of particular importance: size, accreditation status, governance, subject matter, and geodemographic descriptor.

Size here is a reflection of the annual number of visits a museum receives, and the groups are defined as ‘small (0–10,000 visits); medium (10,001–50,000 visits); large (50,001 to one million visits); and huge (over one million visits)’ (Candlin et al., 2019, 57). This is important to discuss for a number of reasons. Intuitively, it would seem obvious that the more in-person visitors a museum has, the more online visitors they are likely to have. This is therefore an important metric both and to evaluate the impact of online posting on on-site visitor numbers. However, the number of visitors can also act as a proxy for the resources available to a given museum, as museums with higher visitor numbers generate more income through ticket sales and shop purchases.⁵⁰

The Governance and Accreditation variables are useful indicators of the resources available to a museum and can be used to categorise museums based on their aims, and financial arrangements. As highlighted in Section 3.3.3.1, in order to become accredited, museums must demonstrate a commitment to education and audience development, as well as a clear funding model (Arts Council England 2018). Meanwhile, governance is defined by who runs the museum, reflecting the museum’s financial arrangements and institutional ties. While defining this is complex, the six overarching categories– Cadw (Historic environment service for the Welsh government), Local Authority, National, Independent Museums, University museums, Other, and Unknown– are further subdivided to give a significant

⁴⁹The analysis of the broader dataset can be found in the teams previous publications (Candlin et al. 2019; Candlin et al. 2020; Candlin and Larkin 2020; Ballatore and Candlin 2023).

⁵⁰This relationship is somewhat more complicated, and is exacerbated by unequal government investment across the UK (see Section 4.1.5).

level of detail (Candlin et al., 2020, 10). Much like accreditation, these categories—for example, the National Trust or Independent not-for-profit—also reflect certain institutional aims. National museums have different priorities to University Museums, which differ yet again from Local Authority museums. As such, Accreditation and Governance can be used to both discuss the resources available to museums, as well as the institutional aims they might hold. This contextualising and qualitative information supported the analysis through all of the studies, as well as the selection of examples that helped explain the quantitative findings.

Subject Matter is a system of classification designed by the Mapping Museums team, and builds on the DOMUS project, expanding an existing list of descriptors to include non-academic subjects Candlin et al., 2020, 9. The subjects—for example, ‘transport’, ‘art’, and ‘local history’—have been adapted to better reflect museum collections. Therefore, it should be emphasised that Subject Matter relates to a museum’s collection, and not the subject of a tweet or post.⁵¹

The last variable is the museum’s Geodemographic Descriptor. As the aforementioned report states, it represents ‘the geo-demographic profiles from the Output Area Classification based on the 2011 census, provided by the Office for National Statistics (ONS)’ Candlin et al., 2020, 12. As the geodemographic sub-groups were developed between 2011 and 2017, they were excluded from the Mapping Museums report as they did not cover the full period of interest—1960 to 2020. However, for this research, it presents a useful—if slightly outdated—descriptor of the area surrounding each museum. Considering the breadth of the descriptors, ‘Scottish Countryside’, ‘University Towns and Cities’, or ‘Ethnically Diverse Metropolitan Living’, they are unlikely to have changed significantly since the profiles were assigned.

Social Media Data

The social media data is defined by the way the APIs run by corporations such as Meta and Google release information. These APIs, discussed in Section 2.4.4), differ by platform. However, broadly, the data of interest to this research takes two forms: information about an account, for example its name, number of posts, and number of followers; and information about individual posts, the number of likes, shares, replies, or the number of comments. While the content of posts and comments can be downloaded from the various APIs, the only thing that is used within this research is the anonymised aggregate data.⁵²

⁵¹To distinguish the two, ‘subject’ has been used to discuss museum collections, while ‘topic’ or ‘theme’ has been used exclusively in relation to social media posts.

⁵²Notably, as will be discussed in Section 3.9.1, the comments themselves were not collected due to ethical concerns. However, the number of comments on a post is available from the API as

The higher level information, such as the number of followers or subscribers for each museum, was gathered using a variety of methods for five platforms– Facebook, Twitter, YouTube, Instagram, and TikTok– and are explored in the Pilot Study. More granular data, including information about individual posts was collected for YouTube, Facebook, and Twitter. Each of these platforms gives researchers access to post metrics through their various APIs. While the account and date and time of posting were always given, the metrics and metadata provided differ between platforms.

On YouTube, views, likes, and the video category (the topic of the video assigned by the creator), were the basis for analysis. More details about what these represent can be found in the documentation for the API Google Developers 2025b.

Broadly similar metrics were collected from Facebook, including likes, the number of times a post was shared, the number of comments, and ‘emoji’ reactions Facebook Developers 2022a. The latter are mechanically similar to likes, but provide additional nuance, with different icons representing different emotions, such as an angry face.

The data from Twitter represents a departure from these relative standardised metrics, and reflects the different features and modes of interaction on the platform. These mechanisms and how they impact the shape of museums audiences are discussed in Section 4.4.1.2. The resulting metrics include likes, retweets, replies, and quotes.

While many of these metrics are self-explanatory, where relevant, what each of these metrics reflect will be discussed alongside the results to help contextualise and caveat the findings.

In addition to these metrics from the APIs, there is one additional metric that I created to help convey overall levels of captured engagement. The total number of interactions, or interactions count, is simply the other metrics combined. That is, for a post all of the likes, number of comments, and other reactions are summed together. It is a simple measure, and is not weighted to prioritise specific forms of interaction.⁵³

Finally, the actual text of posts was gathered for both Facebook and Twitter. This is explained at length in Section 3.6, and forms the basis of the Population Study.

a number, in the same way as the number of likes. The comments themselves are not requested when collecting this aggregate number, and the two are usually accessed through different APIs entirely.

⁵³It would be possible to weight the metrics in such a way that rarer or more desirable forms of interaction for museums– such as comments– score more highly. The distribution and relative occurrence of interactions is discussed within the Population Study (p. 148).

Website Data

In addition to these two key categories, supplementary data was scraped as part of the Website Study. The process is described in Section 3.7.1, and resulted in the collection of museums' URLs and screenshots of the websites' homepages and collections pages. Each of the pages were archived, and the html stored. As this form of data is not as immediately accessible to readers in the same way as simple metrics, such as likes, Sections 3.7.2.2 and 3.11 explain how the visual data is handled in depth, while Section 3.7.2.1 discusses the html.

3.3 Pilot Study

The first of the six studies, analyses a representative sample of 315 accredited museums. It explores their online presence across five social media platforms – Facebook, Twitter, Instagram, YouTube, and TikTok – and museum websites, combining this new data with pre-existing efforts to identify trends in online offerings and audience reception. Its primary goals were as follows:

- The creation of a representative dataset recording UK museums' use of social media accounts that can act as a benchmark for evaluation.
- To supplement existing qualitative data gathered during the pandemic with quantitative evidence, identifying sector-wide trends that contextualise the anecdotal accounts of museum practitioners.
- The development of a scalable methodology that can be used to conduct large-scale studies across the UK, and in the future, globally.

The primary aim of the Pilot Study was to create and refine a scalable pipeline for creating a dataset of museum websites and social media accounts that for the basis of a benchmark for the sector. However, in order for the results of the initial pilot to be useful in isolation, I selected a representative sample, so that the findings – such as what proportion of museums used each platform – were generalisable to the wider sector. The size of the sample then – one of the largest conducted within the European museum sector at the time of publication – is less important than the care with which the sample was chosen.

3.3.1 Data Gathering

3.3.1.1 Sampling

A stratified random sampling method was used to select a sample from the Arts Council Accredited Museums by dividing them into strata based on the governance of museums – either independent, university, local authority, national, National Trust, English Heritage, National Trust for Scotland, or Historic Environment Scotland – and then randomly selecting a number of museums from each group that is proportional to their presence in the population (Arts Council England 2021).

Cochran’s formula was used to identify an appropriate sample size. The formula can be used on large or even infinite populations where the exact population size is not known. However, as there are 1,731 Arts Council museums (including accredited and provisionally accredited museums), Cochran’s formula corrected for small populations and the exact number is used. In this case, n is the sample size, N is the population size, e is the desired level of precision, p is the estimated proportion of the population with the desired attribute (if unknown 0.5 is the maximum), q is $(1 - p)$, and Z is the area under the normal curve with the tails cut based on the desired confidence level (Cochran 1977).

$$n_0 = \frac{Z^2 pq}{e^2} \quad (3.1)$$

$$n = \frac{n_0}{1 + \frac{(n_0 - 1)}{N}} \quad (3.2)$$

This formula attempts to find the size of the sample you would need for the mean – the average – of that sample to be the same as the population. The more confident the researcher needs to be – and the lower the error rate – the larger the sample required. As applied to the list of accredited museums, achieving a 95% confidence level and margin of error of 5% required a sample size of 315.

The formula, however, assumes that the data is normally distributed – where the data is symmetrically clustered around a central point, which represents both the mean and median. Data points are more likely to fall closer to the mean than further away. This type of distribution, also called Gaussian – or normal – distribution, results in a bell curve graph, and is seen in measures such as human height, test scores, and retirement age. However, many variables do not follow

this distribution. Cochran gives the example of economic variables, such as farm size, which have a few large units and many small units (Cochran, 1977, 40).

Because of the assumptions of this formula, this sampling method is not used in any further studies, in part because this Pilot Study provided more details information about the distribution of the data (Section 3.3.2). While the Population Study abandons sampling to explore the whole population, on rerunning this Pilot Study, an alternative sampling formula would be used.

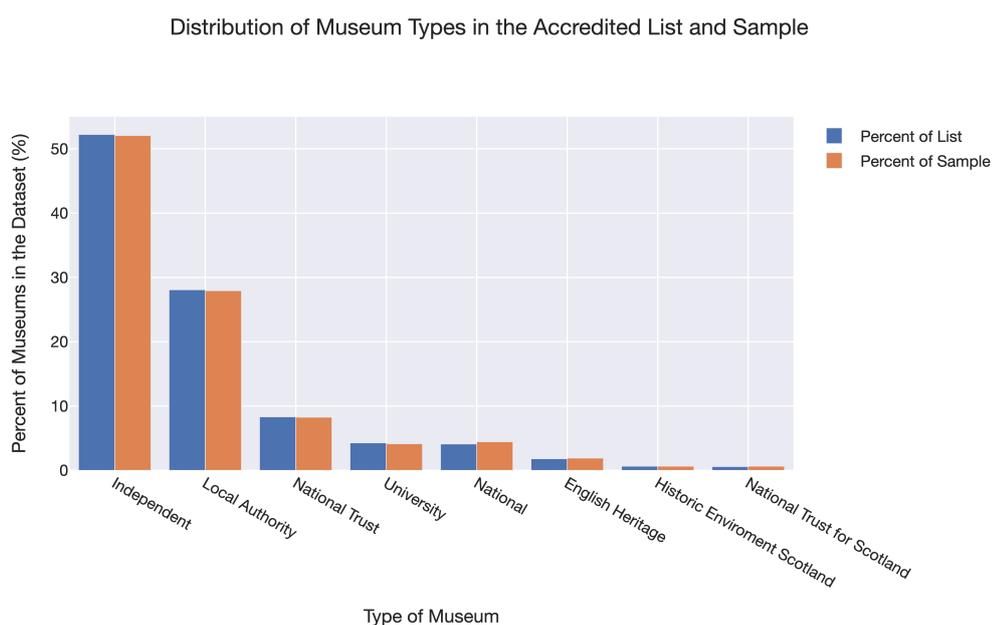


Figure 3.3: Distribution of governance of museums in the sample dataset vs the Arts Council's Accredited List.

The distribution of museums' governance in the sample thus reflects those of the accredited UK museums and is shown in Figure 3.3. However, basing the strata on museum type risks the sample being skewed in other ways, as governance of museums is not distributed evenly – National Trust for Scotland and Historic Environment Scotland are only found in Scotland. This effect is demonstrated by the distributions of the ONS regions in Figure 3.4 and countries in Tables 3.1 and 3.2, where the largest discrepancy between the population and sample is found in the South East of England which is underrepresented by 4.3%. However, Table 3.2 indicates that when broken down by country, the sample is accurate to 0.6%.⁵⁴

Creating a representative sample has meant that the absence of data – for example, the inability to find a website URL or social media handle – can be used

⁵⁴This indicates that the percent of museums in the sample from a given country and type – e.g. Independent Welsh museums, or Local Authority run museums in Scotland – does not vary more than 0.6% compared to the percentage of those museums found in the UK.

3.3.1.1. Sampling

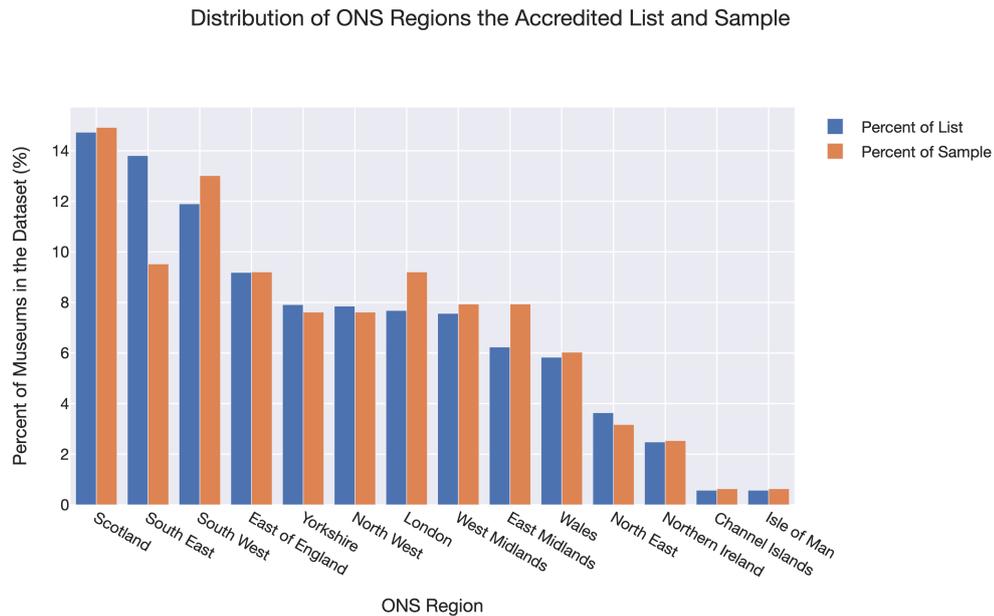


Figure 3.4: Distribution of ONS regions in the sample dataset.

ONS region	No. in pop.	% of pop.	No. in sample	% of sample	(% of sample – % in pop.)
North East	63	3.6	10	3.2	-0.4
North West	136	7.9	24	7.6	-0.3
Yorkshire	137	7.9	24	7.6	-0.3
East Midlands	108	6.2	25	7.9	1.7
West Midlands	131	7.6	25	7.9	0.3
East of England	159	9.2	29	9.2	0
London	133	7.7	29	9.2	1.5
South East	239	13.8	30	9.5	-4.3
South West	206	11.9	41	13.0	1.1
Wales	101	5.8	19	6.0	0.2
Scotland	255	14.7	47	14.9	0.2
Northern Ireland	43	2.5	8	2.5	0
Channel Islands	10	0.6	2	0.6	0
Isle of Man	10	0.6	2	0.6	0
Total	1,731	100	315	100	

Table 3.1: Discrepancies in the distribution of ONS regions and countries in the accredited museum dataset and sample dataset (statistics of particular interest are highlighted throughout).

to estimate the percent of UK museums that do not use a given tool or platform. With digital inequality in the sector rising, this is a valuable metric that allows us to identify the types of museums unable, or disinclined, to overcome the obstacles to digital participation. However, there are limitations to a representative sample. As shown in Table 3.2, the relatively small number of museums in the Channel Islands and Island of Man makes abstractions or comparisons based on that grouping impossible due to the high variability in the data; the results of a single atypical

3.3.1.2. TripAdvisor Pipeline and Validation

ONS region	No. in pop.	% of pop.	No. in sample	% of sample	(% of sample – % in pop.)
England	1,312	75.8	237	75.2	-0.6
Scotland	255	14.7	47	14.9	0.2
Wales	101	5.8	19	6.0	0.2
Northern Ireland	43	2.5	8	2.5	0
Channel Islands	10	0.6	2	0.6	0
Isle of Man	10	0.6	2	0.6	0
Total	1,731	100	315	100	

Table 3.2: Discrepancies in the distribution of ONS regions and countries in the accredited museum dataset and sample dataset.

museum would affect our understanding of purportedly sector-wide trends.

3.3.1.2 TripAdvisor Pipeline and Validation

The Tripadvisor Pipeline was developed to create a reliable method to automate the process of collecting museums' URLs for further analysis. Once the sample museums were selected, the names were taken from the Arts Council accredited list and used to scrape the URLs from Tripadvisor– a travel comparison and review site. The process was automated through Selenium, a tool to automate web browsers, and the web scraping library BeautifulSoup (Richardson 2022; Selenium Developers 2022). The URLs for each of the 315 museums was then checked manually to identify errors. With 4,912 UK museums listed on Tripadvisor– 721 more than the Mapping Museums Project– the site had a URL listed for every museum in the sample. As the world's largest travel website, its large community of contributors was able to validate the links, producing highly accurate results even when the museum itself had an outdated or confusing web presence. Museum websites are frequently not optimised for search engines and prove difficult to find without a direct link or contextual knowledge. This became evident running the names through third part tools such as Clearbit or Crunchbase – which returns the domain with the highest web traffic for a given company name (Clearbit 2020; Crunchbase Data 2022). These tools only returned results for a third of the sample and illustrate the limitations of web scraping with limited human validation.

TripAdvisor proved a more reliable method of gathering valid museum URLs. To assess the TripAdvisor pipeline, each of the URLs and social media accounts of the 315 museums were validated by hand to assess accuracy. In this small sample, a TripAdvisor URL was available for every museum. More importantly, the TripAdvisor links differed significantly from the top Google search results, seemingly pointing to the most frequently updated, or active, website for the museum. In this case of a museum having multiple websites or additional web presences on

aggregators sites such as the National Trust website or local tourism boards, the human-submitted links from TripAdvisor proved particularly useful. Overall, some form of official website was found for every museum, with 42.5% of museums being hosted by a larger organisation – most frequently by a local authority – while the remaining 57.5% had their own website.

The collected and validated websites were then scraped for links to social media channels, which once again were checked individually. Many museums did not provide links to their social media on their website, and a manual check on each social media platform was used to consolidate these results. Notably, accounts with less than 10 followers were difficult to find even using the search tools of each social media platform. To validate accounts across five platforms was only made possible by the relatively small number of museums in this Pilot Study, and this step was taken to support the scaling of the process to the entirety of the UK.

This manual approach also facilitated the inclusion data from social media platforms without APIs – such as TikTok. The only other large-scale assessment of TikTok use was an online survey of 385 UK museums that identified ‘less than 15 percent of institutions had a TikTok account’, however, respondents in this kind of study are more likely to come from larger and well-resourced museums (Statista 2024). The representative sample in this study then, helps identify and correct for this bias.

As highlighted in the literature review, museums approached about – and most likely to participate in – such surveys are often larger and better resourced (Bethlehem 2010; Gran et al. 2019; Nuccio and Bertacchini 2021; Chaplin et al. 2023). As the interview participants make clear (p. 223), it is precisely these museums that are likely to have invested the significant resources required to run a TikTok account. Therefore, this survey likely overestimates the proportion of museums that have an account on the platform; the survey suggests that 12% of museums have a TikTok account, however, in this representative sample that figure is just 7% (Statista 2024). Considering the significant drop in levels of adoption between the pilot and population studies in this thesis – due to broadening the study to unaccredited museums – it is likely that the true figure is lower than that still (Section 4.4.1.1).

Finally, using the scraped social media links from the websites, the Twitter and Instagram data were both accessed by generating authentication tokens using the relevant APIs and then using the tweepy, PyCrowdTangle and instaloader python libraries, and respectively to query the data (Roesslein 2020; Zapata 2020; Graf 2022).⁵⁵ Additional data, such as the number of tweets and number accounts the

⁵⁵Each of these libraries is effectively a ‘wrapper’, whose main purpose is to forward requests

museums follow, were easily accessible through tweepy and were also added to the dataset. As YouTube will be explored in-depth, the use of the API is described in addition to the channel information, data from individual videos, such as the upload date and ‘viewcount’, were also gathered. This process is explained in detail in Section 3.4.1.

3.3.2 Analysis

The analysis within the Pilot Study aims to establish trends in social media use across a number of platforms, identifying their relative popularity amongst museums and the size of museums’ online audiences. As such, the approach is predominantly statistical, and explores how the average levels of uploads and engagement changes between different types of museums (see Section 3.2.2). Consequently, the first step was to explore the distribution of the data, as this dictates which statistical methods are most appropriate.

As shown in the histogram (Figure 3.5), the size of online followings is heavily left skewed.⁵⁶ Normal distribution would look more like a traditional bell curve – also called Gaussian distribution – which is common in the biological sciences. For example, a bell curve might be seen when measuring the height of a population. Many standard statistical tests work on the assumption that the data has this distribution and is ‘normal’.

In this case, however, there is a power-law distribution. This was visually identified using a histogram (Figure 3.5), and Q-Q plots. Q-Q plots – or quantile-quantile plots – are designed to compare two distributions. Here quantiles of a theoretically perfect distribution are charted against those of the real-world data observed. By exploring how well these align, it is possible to quickly identify whether a given distribution model fits the data.⁵⁷ In these visualisations linearity – the straight line – is necessary but not sufficient to conclude there is power-law distribution. This is due to the fact that log-normal and exponential distributions produce similar outcomes (Clauset et al., 2009, 15-16).

to the API from within the python environment. However, these wrappers offer a limited range of features. While accessing the follower counts on each platform was relatively easy, more detailed metrics – such as those of posts and very small organisations – were inaccessible. Therefore, the additional data were gathered directly from the APIs.

⁵⁶As the distribution was clearly not normal, a normality test such as the Shapiro-Wilk was unnecessary, but running the test did confirm that the distribution is not normal (Das and Imon 2016).

⁵⁷As distribution of many different variables – e.g. number of followers, page views – were tested, not all of the visualisations have been included. However, a guide to understanding examples of Q-Q plots can be found in tutorials by Geeks for Geeks and Pith of Performance (Gunther 2011; Geeks for Geeks 2024).

The distribution could be confirmed with further testing. However, as the reliability of these plots and tests are heavily reliant on the size of the dataset, they are more appropriate for the larger Population Study. For the Pilot Study, these visualisations were considered sufficient to inform the analysis, especially as this study does not train models to predict the data, which would require a more sophisticated understanding of the distribution.⁵⁸

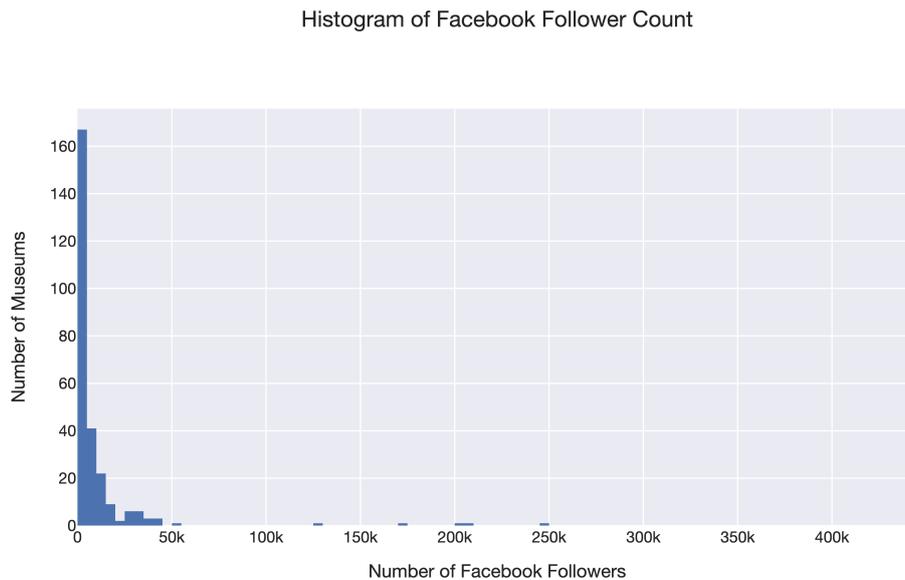


Figure 3.5: Long-tailed distribution of the number of followers museums have on Facebook.

Most importantly, a non-normal distribution was identified, which limits the statistical tests that can be used. Some – such as a t-test and ANOVA – are ultimately a comparison of means, a form of average that is highly susceptible to extreme outliers. This renders them ineffective on this social media data (Verma and G. Abdel-Salam 2019). The median presents a better summary of the data for non-normal distributions, and it will be used to calculate the average – unless otherwise specified – throughout this thesis.

In terms of statistical tests, there are many that do not make assumptions about the distribution of the data, which are referred to as non-parametric methods

⁵⁸If prediction was the aim, the most appropriate approach would be to transform the data into a more manageable distribution for analysis (Nair et al. 2022). However, while this works well for prediction, it somewhat hinders comprehensibility for a non-expert reader. As these findings will be presented to museum professionals, understandability has been prioritised over predictive power. In the same vein, as my aim to understand the relationships between variables, outliers have not been excluded from the figures and tables without comment but have been highlighted and explained (Rousseuw and Hubert 2011).

(Parab and Bhalerao 2010). This is a trade-off. While these statistical tests offer flexibility, they are less likely to detect a difference between variables or relationship, even if it does exist in the data (Gómez et al. 2008).

Different tests were chosen based on the attributes of the variables and used to identify areas of the data to explore further (Nussbaum 2014).⁵⁹ The hypothesis tests are arguably the most important of these. These tests are used to assess if there is sufficient evidence in the data to reject the ‘null hypothesis’ – that there is no significant difference between groups in a population or a relationship between variables. The Kruskal-Wallis Test is a non-parametric hypothesis test that compared groups in a population and relies on median instead of mean. Here the null hypothesis is that the median is the same for all groups, while the alternative hypothesis is that the median is not equal for all groups.⁶⁰ The result of this test is a p-value. A p-value of less than 0.05 is the usual threshold for statistical significance. This represents there being a 5% likelihood that this data would be observed if the null-hypothesis was true (i.e. that there is no relation between the two variables). P-values are used controversially and are often misunderstood as a representation of how ‘true’ something is or an error rate (Hubbard 2011; Andrade 2019).⁶¹ However, they are still an invaluable tool and reporting them is common practice across a wide range of fields (Ioannidis 2018; Lakens 2021).

The one place where a parametric method has been used is for the simple linear regression (Figure 4.1), this was an attempt to prioritise clarity and utility to museum practitioners. It is common practice for researchers to visualise social media data as linear relationships– as in the case of the study by Chatzopoulou, Cheng Sheng, and Michalis Faloutsos (2010). While this does not accurately reflect the true relationship between variables, it is a simple way to convey to readers a general positive correlation.

Like all of the visualisations in this thesis, these images were created using *plotly*, a python library that specialises in interactive graphs, while data analysis and handling were predominantly conducted with *pandas* – for data handling – and

⁵⁹Notably, this non-normal distribution reoccurs in every study. As such, increasingly sophisticated statistical methods were adopted and differ throughout, as I gained a deeper understanding of long-tailed distributions.

⁶⁰This is checked between each variable and the dependent variable– the one measured– which here would be the number of followers a museum has. For example, when looking at the impact of museum size on audiences, the null hypothesis would be that the average small, medium, and large museums would all have the same average number of followers. It is necessary to prove there is enough evidence to reject this hypothesis, before continuing with the analysis.

⁶¹Humans are exceptional at identifying patterns, and one way of conceptualising the p-value is thinking of it as the likelihood that you are identifying patterns in random noise. It is, however, not an indication of what that pattern is, what it means, or what has caused it.

scipy, which is the most popular library for scientific computation (McKinney 2010; Plotly Technologies 2015; Virtanen et al. 2020).

3.3.3 Limitations

3.3.3.1 Unaccredited Museums

This study focuses on accredited museums. When the study first began, the Arts Council list of accredited museums was one of the largest and most comprehensive lists of museums the UK. However, during the course of this research, the first iteration of the Mapping Museums dataset was made available online, with a number of papers published in the following year three years (Poulovassilis et al. 2021; Ballatore and Candlin 2023). This project made feasible a broader study of the unaccredited sector. This highlighted the benefits of the iterative approach, which enabled the planned studies to be quickly adapted in response to developments in the surrounding research landscape. As a result, it was possible to include unaccredited museums in the later studies.

However, as a collaboration with the Mapping Museums Project team quickly formed and a larger study of the entire sector was planned, I chose to continue to use the Arts Council list and limit the Pilot Study to accredited museums. There were two primary reasons for this, the first was to develop a prototype rapidly while the Mapping Museums data was cleaned and finalised. The second, was that that the accredited museum data had already been widely discussed in both research and policy domains, and enables the inclusion of a significant amounts of additional material.

As part of the accreditation process these museums made a commitment to ‘be accessible to the public’, ‘understand and develop [their] audiences’, and ‘engage with [their] users, and improve their experience’ (Arts Council England, 2018, 9-11). Under these overarching headings, the Arts Council mandates specific documents and plans that are necessary for applicants:

You’ll need a plan for developing your range of users. You should look at who does and who doesn’t use your museum and how to provide an experience to meet expectations. These might be part of a separate audience development plan, or in your forward or business plan. (Arts Council England, 2018, 10)

Therefore, museums in the Pilot Study have, and often make publicly available, an audience development plan and clear funding model. This contextualising and

qualitative information enabled the selection of a case study and examples that were relevant to the discussion around value and metrics. This is particularly pertinent to accredited museums, who must demonstrate a commitment to education and breadth of appeal. As the Accreditation Standards state: ‘You should have a variety of ways for people to learn. These should help a broad range of people to access your museum and collections, bearing in mind that you’ll need different approaches to engage with different groups’ (Arts Council England, 2018, 11). These priorities within the accreditation framework closely aligned with the Arts Councils’ wider mission and funding framework, and closely reflect the arguments that justify government expenditure in the arts (p. 13).⁶² As such, with further studies on the horizon, the digital strategies of this relatively homogenous group of museums offered an insight into how government policy directly shapes museums’ approaches to outreach and communication.

3.3.3.2 TripAdvisor Methodology

While the TripAdvisor pipeline was 100% accurate for gathering website URLs in this study, the focus on accredited museums likely created favourable results. Accredited museums are likely to be larger and therefore have higher visitor numbers than their unaccredited counterparts, and this is likely to result in more TripAdvisor users – potentially increasing the accuracy of URLs found on the site. The updated accuracy for the whole sector are provided in the Website Study methodology, alongside the accuracy rates of the latter half of the process – where the websites were scraped for social media handles (Section 3.7.1). Within this smaller Pilot Study, incorrect or missing social media accounts were manually corrected.

3.3.3.3 Closure of Services

Unfortunately, several tools used during the course of this research have been discontinued. This study was significantly impacted by the closure of the Alexa

⁶²Debates around funding of the arts have continue throughout the duration of this thesis. The Arts Council website currently states: ‘the scope of the Government’s imminent Spending Review has become clearer. It will now be a zero-based review, meaning that every budget line across all departments will be reviewed from scratch, including the money the Arts Council receives.’ (Arts Council England and PS Research 2025). A government briefing explained the process behind this zero-based approach; ‘the government will set budgets from zero and assess all spending for value for money rather than beginning from existing budgets and deciding increases or decreases’ (Brien 2025). In practice this means that every cost that was previously approved must be justified again, and there is no guarantee of a minimum budget for previously funded organisations. This has caused uncertainty across the UK arts sector, as the Arts Council acknowledged, ‘We are currently in discussions with the Government on this recommendation... We recognise that this news creates significant uncertainty for organisations’ (Arts Council England and PS Research 2025).

ranking platform, as it was being used for analysis. Multiple studies within the museum sector have used the Alexa ranking to indicate the relative popularity of museums websites (Enhuber 2015; Zafiropoulos et al. 2015; Camarero et al. 2016; Alexa and Amazon 2022a). Padilla-Meléndez and Águila-Obra successfully predicted museums' online strategies by combining museums' Alexa rankings with the size of their social media following, while Marisa Enhuber was able to use the geographical data from Alexa to analyse the global reach of the Tate's website (Padilla-Meléndez and Del Águila Obra 2013; Enhuber 2015).

Before the discontinuation of alexa.com on 1 May 2022, museum URLs were used to retrieve website's Alexa traffic ranking as a gauge of popularity, a metric commonly used in museum studies (Enhuber 2015; Zafiropoulos et al. 2015; Camarero et al. 2016; Alexa and Amazon 2022a). With this tool suspended, the Pilot Study instead explored the correlation between popularity across multiple social media platforms (Figure 4.1). However, it is notable that an analysis of a preliminary dataset for the study comprising of 91 English museums, found a statistically significant relationship between museums' Twitter following and Alexa traffic rankings. It is therefore probable that many of the museums that perform well on social media also have popular websites.

3.4 YouTube Study

The YouTube Study builds on the Pilot Study, drilling down into the data, and exploring museums use of the platform at the level of individual posts. In a recent study of interactive behaviours on Facebook, Gillian Moran et al. discovered that video content was particularly effective at encouraging 'clicks', 'likes', 'comments', and 'shares' (2019, 534). Combined with the perceived popularity of video content in surveys of museum practitioners, YouTube was chosen for in-depth study as a likely site of change over the pandemic (NEMO 2020b).⁶³

Part of the reason for this interest is the relative underutilisation of YouTube by the museum sector and within academic studies. As the Ofcom 2021 'Online Nation' report describes:

YouTube was the most popular app across all mobile devices in the UK in September 2020, by reach and time spent per visitor per day.

⁶³While TikTok is also predominantly a video-based platform, the platform has only recently made an API available to researchers. While this study was being conducted, small scale trials had begun in US research institutions, but access was not yet available to UK researchers (Lurie and Schroeder 2023; TikTok 2023). This precluded large-scale research on the platform.

Users spent almost twice as much time on YouTube every day as on Facebook, which was in second place. (Ofcom, 2021, 25)

Yet, as the Pilot Study highlighted, only 45.7% of accredited museums used the platform. This study was in part designed to explore the apparent disjoint between audience behaviours – or crudely, public demand – and the digital experiences that museums were providing.

In addition, by focusing on a single platform, it is possible to gather far more data from the platform API and expand the scope of the data collection. For this study, metrics were collected for both the museums channels and each individual video on these channels, enabling a fine-grained analysis of trends in museums' content. In addition, by focusing on a single platform, the date-range of posts was expanded significantly, and the metrics of each museum's videos over the course of a decade. While the focus remains on the pandemic period, this additional data is used to contextualise the findings and produce a pre-pandemic benchmark against which the 2020 videos can be compared.

The methodology closely resembles that outlined in the Pilot Study, with one significant difference being the integration of data from the YouTube API –or application programming interface.

3.4.1 Data Gathering

While the YouTube Data API limits the number of queries per day, it is the most accessible API of the major platforms and does not restrict researchers' ability to generate large data sets through the use of authentication tokens (Chatzopoulou et al. 2010; Henry 2021). The Twitter, Instagram and Facebook APIs severely limit access to public data without special permissions obtained through academic research applications (Twitter Developers 2022; Facebook Developers 2022b; Facebook Developers 2022c).

I accessed the API between 23–30 June 2022, and produced two dataframes, one held channel information and the other information about the videos. The data included is detailed in Figure 3.2. The first dataframe – which contained channel data such as the channel ID, subscribers, creation date – was then supplemented with the Mapping Museums dataset to add additional contextual information such as museum size and location.

The second video data frame included data such as the date a video was published, the video's category,⁶⁴ and it's number of views or 'viewcount' (Google

⁶⁴The video category is chosen from a dropdown list at the point that a user uploads the video.

Developers 2025b). This viewcount provided a snapshot of the videos' popularity two years after the first lockdown measures eased. While the initial reception of the videos may not be reliably reflected in the 'viewcount', it is still a valuable measure. YouTube videos most commonly hit a peak in popularity within days of being uploaded, and over the years there is evidence to suggest that the 'lifespan' of YouTube videos is getting shorter (Pinto et al. 2013; Jiang et al. 2014). A recent study by Noriaki Kamiyama and Masayuki Muratahas found a lognormal distribution of videos' daily view count, which 'dramatically decreased over several days just after their upload day and decreased moderately after this initial period' (2019, 1103). Therefore, even two years after an upload, the number of views is still likely to reflect a video's initial reception. It should also be noted that the view count can only increase over time, which could lead to an optimistic assessment of the sector. Being aware of these limitations and bias, the number of views remains a valuable metric in the dataset.

3.4.2 Analysis

As the YouTube Study was designed to explore the changes in museums' digital strategies over the pandemic, a similar statistical approach was taken as in the Pilot Study. Here, the profiles of museums were supplemented by a more in-depth exploration of the video museums uploaded to the platform. Including details about individual posts (in this case videos) had the additional benefit of capturing temporal data, such as when videos were uploaded. As a result, the same comparison of averages used in the Pilot Study, could now be used to explore how both uploading habits and audience reception changed over time.

Both the view count and channel followers varied dramatically – each replicating the power law distribution seen in the Pilot Study. As such the same methods were used for statistical analysis, and averages represent the median over the mean – to minimise the effects of outliers. This distribution was the primary motivation for adopting an exploratory approach to analysis and visualisation, that did not focus on accurate prediction or modelling. Through the Channel IDs column – which is found in both datasets – it was possible to cross-reference the two to establish how view counts changed over time, how attributes such as size impacted viewing figures, and explore the uploads of an individual channel.

3.4.3 Limitations

3.4.3.1 YouTube API

While the capabilities of the YouTube Data API provide ample tools for this research and removes the need for web scraping, it has its own limitations. The examined literature has all been limited to a snapshot of a video's popularity over a short period of time – at best providing a few months of comprehensive data (Cha et al. 2009; Chatzopoulou et al. 2010; Figueiredo et al. 2011). As the API attribute 'viewcount' only contains the number of views at the time the API is accessed, charting the popularity of a video through time requires accessing the API repeatedly over a given period. This makes it impossible to chart a video's changing popularity in retrospect, as measuring the popularity of a large number of videos – especially without the benefit of hindsight to inform a project's focus – is costly in both time and API requests, increasing the necessary financial outlay.

3.4.3.2 Data Availability

As only 144 of the 315 museums use YouTube, the sample for this study is small. Much like in the Pilot Study, YouTube channels were only included if it was predominantly museum content, removing many channels run by local authorities. This small number of channels enabled the easy gathering of data at both the post and channel level with over a decade of videos without reaching the daily quota of the API (Google 2025b).

Yet, the small volume of data posed more a problem when it came to reception. Chatzopoulou, Sheng, and Faloutsos found that an average YouTube video receives one interaction –that is a comment or a like – for every 400 views (2010, 2). With half of museum YouTube channels in the UK having less than 46 subscribers, the majority of videos receive no comments at all (Charlesworth, Warwick, Impett and Beresford, 2023, 11). Therefore, while comments are not collected for ethical reasons, the number of comments likely left on museums' YouTube accounts would not be sufficient to evaluate audience engagement using more sophisticated techniques such as statistical methods, network analysis, topic modelling, or sentiment analysis (Section 3.9.1).

This highlights an issue often faced by museum practitioners. It is only through the aggregation of many museum accounts – such as in the Population Study – that there is enough data to accurately identify broader trends in audience reception. The data for a single institution – or even the 315 organisations of this study– will

often be inconsistent in output and have so few interactions that it is difficult to extrapolate wider trends.

3.4.3.3 Video Analysis

Over the course of this research, there have been significant developments in both computer vision, speech recognition, and natural language processing. In addition, multimodal models – such as OpenAI’s CLIP – identify relationships across different types of data, such as text and image, or sound and video (OpenAI 2021a). These are the foundation for the text-to-image generative AI models, such as DALL·E (OpenAI 2021b), or most recently the VEO3– a Google model that generated video with sound (Deepmind, Google 2025). Consequently, it is possible to identify the content, setting, characters, and speech in videos using computational methods, while both automatic speech recognition and generating descriptions of a video (video-to-text) have become widely available accessibility features (Somandepalli et al. 2021; Prabhavalkar et al. 2024). These descriptions, alongside transcript analysis, would provide a more sophisticated way of categorising videos than the ‘category’ taxonomy provided by the YouTube API (Peng and Lu 2023). While rerunning this study with a greater focus on video content would be fascinating, it was not possible within the time constraints of this research and would necessitate storage arrangements for a large quantity of videos.

3.5 YouTube Case Study

The case study drills further into the YouTube dataset and aims to establish *why* some videos do better than others. To this end, the case study focuses on the British Museum YouTube channel, and their best performing video, titled ‘Vikings Live’. This video has been viewed over 8 million times and was the single most viewed video in the YouTube dataset. This case study contextualises this video with another, near identical, video on the British Museum’s YouTube channel, ‘Pompeii Live’, in addition to the publications and policies published by the British Museum.

By investigating a single video in depth, it aims to explore how content is disseminated on platforms such as YouTube and the way this impacts the metrics reported by the platform. Therefore, this study asks whether the metrics on social media platforms are truly reflective of audience engagement.

The analysis mirrors those of the YouTube dataset and is therefore not reiterated again. Instead, the following section exclusively discussed in what ways the methods and tools differed between the studies.

3.5.1 Data Gathering

The data collection differed in this case study as, contrary to the larger YouTube Study, it aims to gather how the number of views on an individual video change over time. In doing so, it aimed to shed light on how engagement changed over the pandemic.

However, there are a number of difficulties in accessing this temporal data. The number of views on YouTube can be accessed by researchers in two ways: either through YouTube's application programming interface; or for small scale research, it is possible to manually check the view count displayed below the video. The first challenge this poses is that unless you are an administrator of the channel that uploaded the video, the number only reflects a snapshot of the number of views at the time it is checked. This means that researchers are unable to chart a video's popularity in retrospect.

Fortunately, over the course of 2020, a significant volume of GLAM digital content was preserved using the Internet Archive. As a non-profit organisation that aims to preserve websites and digital artifacts, their tool, the Wayback Machine, enables researchers to see snapshots of museum websites and social media taken throughout the pandemic period. Anyone is able to add a webpage to the archive, and between May 30, 2020 and March 14, 2023 'Vikings Live' was archived using the Wayback Machine over 70 times (British Museum 2020c). Although not comprehensive, these archived versions of the YouTube page enable the reconstruction of the views the video received in the three years since it was first uploaded (Figure 4.17 and 4.14).

A list of the URLs of the archived page was created using the Internet Archives' API and BeautifulSoup as used to scrape the information needed from the loaded webpage.⁶⁵

Unfortunately, this method relies on the repeated archiving of the YouTube page by an individual over a prolonged period of time. As such, it was not feasible to do a comparative study on a video was a small number of views as the majority are not archived at all – and certainly not repeatedly. Looking at a random sample of

⁶⁵It should be noted that there are a number of helpful GLAM and Digital Humanities orientated toolkits that walk researchers through accessing the internet archive API, including both the GLAM toolkit (Sherratt et al. 2023) and the Programming Historian (McDaniel 2021).

videos of across the YouTube dataset, it is more common for individuals to archive viral videos that are experiencing a surge in popularity, with archiving ceasing when the video count stabilises.

3.6 Population Study

The Population Study– named for the fact it investigates the entire statistical population of museums, as opposed to a sample– builds on the previous studies, expanding both the scope and scale of analysis. It analyses a dataset of over 3,250,000 tweets and 1,450,000 Facebook posts and explores audience reception: what types of posts prove most popular; which types of organisations receive the most interactions; and which topics result in higher levels of engagement.

While the previous case studies have highlighted just how limited social media metrics– such as ‘views’, ‘likes’, and ‘shares’ – can be, the Population Study explores alternative forms of analysis. In addition to the approaches previously outlined, it draws from a range of natural language processing techniques, including topic modelling, alongside network analysis. Building on the discussion of the benefits and drawbacks of these approaches in the literature reviews, this chapter will explore how they were used to address some of the concerns surrounding quantitative metrics. While these techniques have been used within the museum sector at a smaller scale, in working with a significantly larger and almost complete dataset, this study presents a more comprehensive understanding of museums’ digital strategies and audience reception and generates a number of new insights about both digital strategies and social media engagement.

3.6.1 Data Gathering

As previously mentioned, the data for this study was provided by the Mapping Museums team. The technical team developed a data gathering tool to automatically gather museums social media accounts and website URLs, using the Mapping Museums knowledgebase as a starting point. The team then used Meta’s CrowdTangle (now discontinued) and the Twitter API for academic research to collect data from 2019 to 2021 to capture the pandemic period. Overall, they captured the posts of 2,560 museum Facebook accounts and 2,223 Twitter accounts. Human validation of a random sample of social media accounts showed that it was over 95% accurate for both Facebook and Twitter data (Larkin et al.

2023).⁶⁶ The full technical details of the process are detailed in an earlier paper by the Mapping Museums team (Larkin et al. 2023).

I was provided with two datasets, one for Facebook posts and one for Tweets. The metadata of these datasets is detailed in Figure 3.2.

3.6.1.1 Additional Cleaning

The dataset did contain duplicates of some museum accounts, acknowledged in their first paper– most often for museum groups such National Museums Liverpool, the Tate, and the Science Museum Group. They were removed, alongside a further sixteen non-museum organisations that were identified manually through visualisations of post counts and levels of engagement. The process of visualisation – especially distributions– highlighted non-museum outliers that may have affected the statistical analysis. In manually reviewing the data inaccuracies, I found that incorrect social media handles largely consisted of tourism and local council websites. Museums, especially smaller organisations, frequently relied on a larger umbrella organisation to provide an online presence (Charlesworth, Warwick, Impett and Beresford 2023). These non-museum accounts have not been removed, as they host museum content, and their participation in cultural heritage campaigns such as #AskACurator and #MuseumWeek provide a valuable insight into social media engagement with the cultural heritage sector. Dropping these accounts would also disproportionately exclude smaller museums. Furthermore, by categorising and discussing posts based on content, their impact on the analysis has been significantly mitigated.

However, inactive accounts were removed, and for the purposes of this study were defined as any accounts that did not post at all during the three-year period. The impact this cleaning had on the results is discussed at length in Section 4.4.1.1.

3.6.1.2 Shift Between Distributions in Pilot and Population Studies

As this large dataset also includes unaccredited museums, it differs in distribution to the sample used in the pilot and YouTube studies. Most notably, there is a significant shift in the distribution of size (Figure 3.6 and 3.7). Unaccredited museums are more likely to be small, and the larger museums are overrepresented in the accredited dataset.

⁶⁶This accuracy rate was improved over the course of this research as non-museum accounts were identified and removed during the analysis (see Section 3.6.1.1).

As larger museums are more likely to have a social media account, this means that the percent of museums on each platform in the Pilot Study likely overestimates digital adoption in the sector, this is discussed alongside the percent of museums using each platform of in the results (Table 4.9).

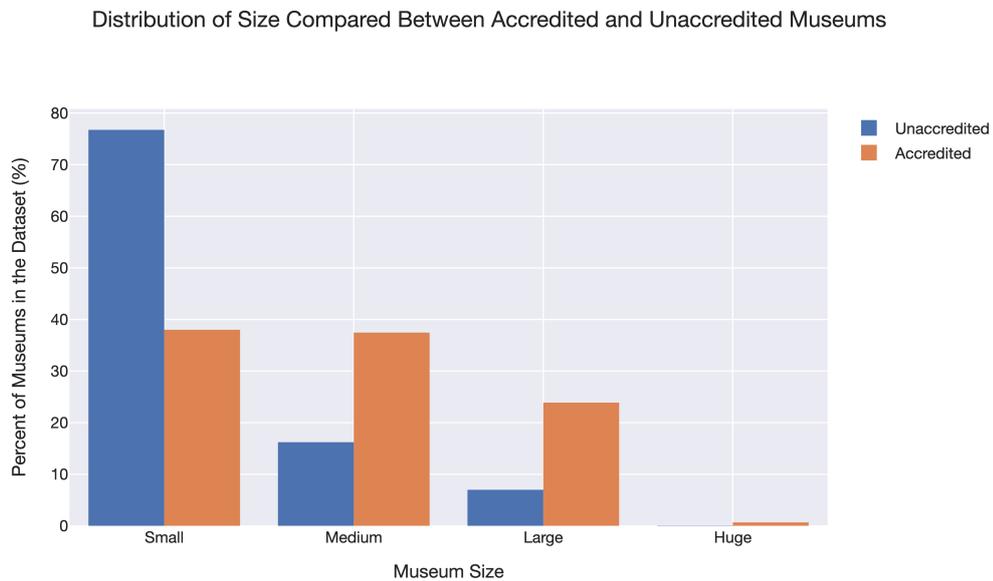


Figure 3.6: Proportion of museum sizes for both unaccredited and accredited museums in the UK. Size here will use the Mapping Museums’ classification system based on the number of annual visits: ‘small (0–10,000 visits); medium (10,001–50,000 visits); large (50,001 to one million visits); and huge (over one million visits)’ (Candlin et al., 2019, 57).

3.6.2 Analysis

The key focus of the Population Study was on audience reception; it looked to evaluate the dissemination of different types of posts, what topics proved most popular, and how the pandemic shaped digital strategies. Ultimately, it aimed to provide a body of evidence that can help inform the decisions of museum practitioners. Therefore, while it begins with the same statistical and temporal analysis as previous studies, additional methods – including topic modelling (Section 3.6.2.2) and a simpler method of grouping posts that use key words (Section 3.6.2.3) – were both used to further explore the content of posts and how this impacted engagement.

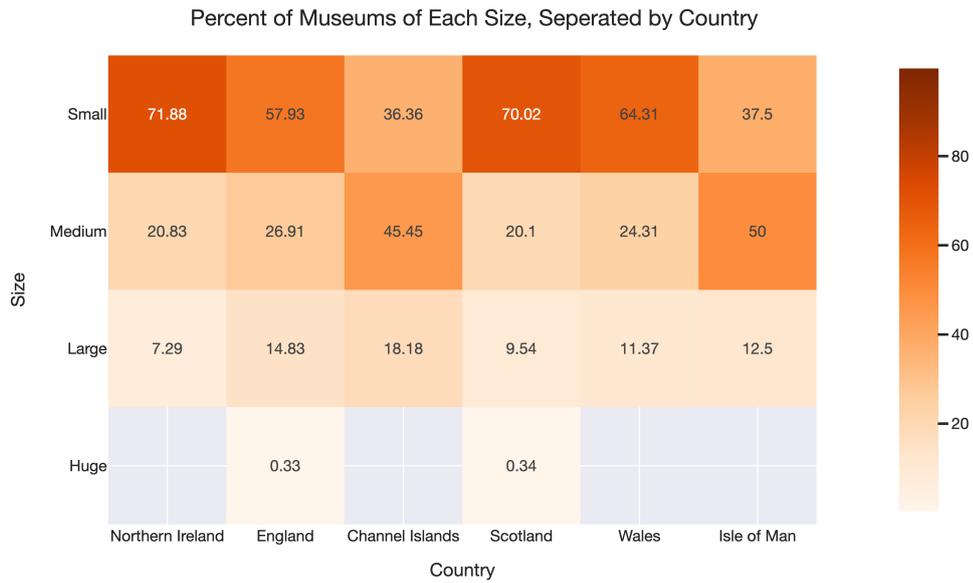


Figure 3.7: Percentage distribution of museum sizes in each country.

3.6.2.1 Statistical Analysis

The initial statistical analysis confirmed the trends identified in the Pilot Study. As highlighted in Section 3.3.2, the social media data is not normally distributed and exhibits an extreme left skew. This was also apparent in the Population Study, where the top 20% of tweets account for 89.26% of all interactions with museums on Twitter, and the top 20% of posts on Facebook receiving 90.33% of all interactions. Similar distributions are found when exploring high performing accounts, with the top 20% garnering receiving 87.08% of all interactions on Twitter and 91% of all interactions on Facebook.

With a larger dataset, the distribution was significantly easier to visualise and calculate. Table 3.3 explores the fit to the data between different distributions. The fit between a power law and other distributions was compared using Log Likelihood Ratios (R). A positive R indicates that a power law distribution is a better fit, while a negative R indicates the distribution being tested against. However, the significance threshold – usually 0.05– must be reached. Therefore, in order to be a better fit than the power law distribution, the R must be negative, and the value of p less than 0.05. This was not the case, and the power law remains the best description of the distribution of the number of interactions on museums’ social media accounts.

Much like in the Pilot Study, this distribution– in which many posts have few inter-

Distribution to test against power law	Log Likelihood Ratio (R)	Significance (P)
Lognormal	0.061	0.375
Lognormal positive	8.797	0.012
Exponential	827.765	0.00
Stretched exponential	18.135	0.001
Truncated power law	-0.004	0.929

Table 3.3: Goodness of fit of the data between a power law distribution and other distributions.

actions, with a few outliers performing exceptionally well– limits the usefulness of many statistical measures based on the mean, variance, and standard deviation (Verma and G. Abdel-Salam 2019). Therefore, the median has also been used instead of the mean, and where medians are compared, and any comparison of medians shown in visualisations has a p-value of less than 0.05 calculated using the Kruskal-Wallis Test.

3.6.2.2 Topic Modelling

Topic modelling enables the posts and tweets to be clustered into groups that discuss similar themes. By grouping posts in this way, the relative popularity and levels of engagement between subjects can be compared in a way that is more generalisable than is possible through other means (see Section 3.6.2.3).

It also addresses a significant barrier to creating a sector-wide benchmark for engagement: the difficulty in running an analysis on the content of smaller organisations who do not have large online audiences. Chatzopoulou, Sheng, and Faloutsos found that an average YouTube video receives one interaction – that is a comment or a like – for every 400 views (2010, 2). With half of museum YouTube channels in the UK having less than 46 subscribers, the majority of videos receive no comments at all (Charlesworth, Warwick, Impett and Beresford, 2023, 11). By performing topic modelling on a dataset that spans multiple organisations, larger trends can be identified to help provide insight into the audiences of small and medium sized institutions that do not have the resources to analyse their own data. Using this kind of data set could identify successful digital strategies and help improve the content of GLAM organisations which do not have large online audiences.

With such large datasets, the manual tagging of topics was not possible. Initially a comparison was made between the topic produced by Latent Dirichlet Allocation (LDA), and an unrefined BERTopic model. BERTopic – a python library

that enables users to conduct neural topic modelling –⁶⁷ produced more human-comprehensible topics, and was adopted for this analysis (Grootendorst 2022). Initial models were created with the parameters fine-tuned for short documents, and I further refined the clusters by implementing a count vectoriser, removing stop words, as well as reducing the weight of frequent words using a class-based term Frequency-Inverse Document Frequency.⁶⁸ This enabled me to mitigate the errors caused by the prevalence of words such as ‘museum’, which were so common that they were not helpful in identifying the topic of a post. After each refinement, I evaluated visualisations of topic probabilities and distance and explored the representative documents for unintelligible topics. To reduce the number of topics I increased the minimum topic size to 500 at the training stage – a strategy suggested by the developer Maarten Grootendorst on datasets with over a million documents– and after investigating the inter-topic distance using visualisations, performed automatic topic reduction. After training, I also performed automated outlier reduction which, in parallel to the relatively high minimum topic size, resulted in more comprehensible topics and fewer outliers than automated topic reduction.

Topic evaluation – for both LDA and BERTopic– often rely on metrics of topic diversity (TD) and topic coherence (TC). While there are a number of ways to calculate TD and TC, they all work on the assumption that texts within a topic should be similar – use many of the same words – and topics should be distinct, sharing few words (Dieng et al. 2020). They are useful indications and can be invaluable for identifying where there are a large number of similar topics. Nevertheless, it is questionable whether it is desirable to optimise for these two metrics. Many topics that emerge in day-to-day conversations contain significant overlap, and it may not always be helpful to combine them into one topic.

It is perhaps unsurprising that manual evaluation remains the gold standard for topic modelling evaluation. The popularity of some measures, such as Normalised Pointwise Mutual Information for Coherence (NPMI), are based on their tendency to replicated human judgement (Lau et al. 2014; Yang and Kim 2025). Yet, as Grootendorst argues ‘Validation measures such as topic coherence and topic diversity are proxies of what is essentially a subjective evaluation’ (Grootendorst 2022). It is common practice to use domain experts to assess topic coherence, and ‘close reading’ of the models is one of the most effective tools for evaluation (Gillings and Hardie 2023). The coherence of the topic was therefore assessed

⁶⁷It utilises transformers– an architecture for deep neural networks – and class-based term Frequency-Inverse Document Frequency (c-TF-IDF).

⁶⁸While this is a dense explanation, this process is usually omitted in descriptions of BERTopic in the digital humanities projects, this is discussed further in Section 3.11.

manually and the outputs of the model were compared with the existing body of evidence amassed over the course of this research.⁶⁹

After fine tuning and refining the parameters for each dataset, I trained three topic models: one for Facebook, one for museums' original tweets, and one for museums' replies. Splitting the Twitter data in this way allowed us to investigate in more detail the replies, which while fewer in number I hypothesised would contain very different topics. This also had the advantage of reducing the number of texts and therefore memory required to train the model. For Facebook, as the dataset was so large, the model was trained on a stratified sample of 90% of the data, 1,008,414 individual posts, to enable it to run with the memory limitations of a personal machine. Of the two models discussed in the paper, the Facebook model produced 223 topics, and the original tweets 202 topics.

Of these topics, the main shortfall of the models occurs in posts which refer to a topic through specific examples. For example, in the Twitter dataset different flowers– bluebells, roses, daffodils, and snowdrops – have all been assigned as separate topics as on manual inspect many of these tweets have very limited overlap in vocabulary. On Facebook, the problem is particularly acute amongst transport museums. With an avid following, many posts do not refer to 'trains', but the specific name or class of a given engine. Once again, close inspection reveals that there is little overlap in the vocabulary of these tweets, despite their similar content. In fine tuning the models, and manually evaluating each, I was able to create multiple apparently robust models with good topic representation and few outliers.

3.6.2.3 A Simple Engagement Metric

To explore the content of posts and tweets in more depth, I compared the levels of engagement between posts and tweets which contained highly relevant words. In contrast to topic modelling, this provided a fine-grained approach and enabled distinctions to be made between words that would otherwise occur in the same topic, for example, 'train' and 'bus' may both appear in a 'transport' topic while receiving dramatically different levels of engagement. However, this does result in a loss of context. This approach does not take into account the entire tweet; if a post was returned when 'bus' was queried, it would be unclear whether a post

⁶⁹Yet, considering the number of different combinations of parameters to be tested a 'close reading' of each model remains an incredibly time intensive task. This was a key motivation for developing metrics such as NPMI. However, another solution – seen across machine learning applications – is the creation of a human-labelled test dataset. This approach poses a challenge for topic models where neither the number of topics nor what they contain are predefined. Potential solutions for this problem are presented in Section 3.11).

was discussing a historic bus in the museum's collection, or visitors' transport to and from the museum.

Initially, key words were identified from the top most relevant terms (Grootendorst 2025b)– scored using the c-TF-IDF scores, which was calculated during topic modelling– for the best and worst performing topics. Further terms were added from additional topics that were relevant to the findings of the Pilot Study (see Section 4.1.6).

Using the NLTK library, the posts and tweets were tokenized– stop words were excluded– and then were lemmatized. The list of relevant words was handled similarly, enabling the comparison and return of inexact matches between the two. This list of posts and tweets– matched to the relevant words they contain– enabled the visualisation of how the frequency of certain words changed over time and the comparison of relative levels of engagement.

I also examined a selection of the best and worst performing posts for each word that was chosen. This was done to check for alternative uses that may complicate the interpretation of levels of engagement, and to ensure that the results were truly representative of the relevant topic. To draw from the previous example, this was a step to ensure that tweets containing 'train' referred to the content of museum collections and not delays on local transport infrastructure. Due to the relative homogeneity of the dataset, none of the words analysed were affected by the introduction of this kind of sampling error.

3.6.2.4 Network Analysis

I also performed network analysis on the Twitter dataset to explore if certain strategies on Twitter, such as regularly mentioning other accounts (denoted by using the @ symbol), resulted in higher levels of engagement. The use of the @ symbol made picking out the accounts mentioned simple in the Twitter dataset. While some Facebook accounts also use the @ sign, it is not a consistent practice, so identifying all accounts mentioned would require the use of named entity recognition, resulting in limiting the network analysis to Twitter. By exploring mentions, it is possible to chart museums interacting with a wider ecosystem of accounts including newspapers, tourist boards, and funding bodies that as non-museum organisations, had not formed part of the original dataset.

To perform the analysis, I used the NetworkX library and Gephi (Hagberg et al. 2008). With over 2,223 twitter accounts, I focused on the core of the network and filtered out any node with a degree lower than 40, leaving 2,323 nodes out of 398,076. When visualizing the network, I additionally filtered any edge with a

degree lower than 10 and removed any self-loops. This reduces the number of edges in the network to 12,309, from an initial count of 98,504.

3.6.3 Limitations

The scale of this research required a fully automated process for data gathering, which limited it to the use of social media platforms' APIs or websites that could be easily scraped. It is therefore heavily shaped by what data is made available by the corporations that own each platform. The Facebook Graph API requires special permissions to access page information, so museums' page likes and follower counts had to be verified manually (Facebook Developers 2022b). Daniel Thiele notes that 'accessing the Facebook API has become more and more difficult for researchers in the past few years' and criticised the lack of transparency, identifying that 'the data returned sometimes exhibits gaps or skewness for unclear reasons' (Thiele, 2022, 193). The reduction in available data since the Cambridge Analytica controversy means that to conduct a larger study including Facebook would require the methodology to be adapted (Venturini and Rogers 2019). Fortunately for the purposes of scaling this research, both the Twitter and Instagram APIs provided useful data that contextualises the data gathered from the YouTube Data API.

I chose to analyse Facebook and Twitter due to their popularity among museums – 64% and 57% respectively – with Facebook being the most widely used social media platform in the UK museum sector. However, due to the size of the datasets and scale of work on these two platforms, Instagram, YouTube, and TikTok are not reinvestigated here. Therefore, while the Pilot Study is smaller in scale, it remains useful to provide an overview of broader range of platforms, providing context for this later investigation.

Lastly, sentiment analysis was not conducted on the posts of museums. The range of sentiments expressed within museums' posts alone are relatively limited compared to those found in the comments from the general public. As the comments were not included in the dataset (see Section 3.9.1), it is questionable that the subtle variations in the institutional tone predominantly adopted by museums can be adequately explored using this method. For this, a smaller qualitative approach, similar to the frame analysis adopted by Jenny Kidd (2011), would likely result in a more nuanced understanding of why museums are likely to choose certain communication strategies. Therefore, while sentiment analysis could be used to highlight outliers within the larger dataset, topic modelling presented a more widely applicable and informative methodology.

3.7 Website Study

Unlike the other studies, this section focuses on museum websites. 2,880 URLs of museums active websites were gathered as part of identifying museums social media handles and is a key element of the TripAdvisor Pipeline described in the Pilot Study. However, museum websites in themselves are an interesting object of study.

This thesis has mainly discussed social media; however, websites are the other primary place that museums publish online. They are the means through which audiences buy tickets, access online collections and virtual galleries, and their inclusion diversifies the digital experiences covered by this thesis. From interactive 3D virtual spaces, to simply listing their address on the local council website– the different ways websites are used represent a broad range of digital strategies. This diversity, however, means that a detailed exploration of the many elements of museums websites was not possible in the given timeframe.

However, the basic analysis presented here expands on some of the findings from the previous studies, exploring common digital tools, inequality in the sector, and exploring which type of organisations primarily support museums digitally. It provides important context for the social media studies, and cumulatively, the research is able to more holistically describe the online audience experience. Unfortunately, while all of these websites are publicly available, there is current no way to gather data on their visitor numbers without collaborating with the website owner directly.⁷⁰ Therefore, this study does not explore audience reception, but instead focuses on how museums are getting online and the technology they use. Using an analysis of the html code and screenshots of websites it has five key aims:

1. Archive UK museum webpages from across the sector.
2. Chart the types of organisations that host museums websites– are there key institutions that provide digital resources and support?
3. Identify the tools and software museums use and explore how this reflects levels of expertise in the sector.
4. Produce a rough overview of the type of information available about museums on their websites– from opening hours to information about collections, and sophisticated online collections databases.

⁷⁰At least not since the closure of the Alexa ranking platform (Alexa and Amazon 2022b).

5. Investigate the user experience of websites and ask if (or how) it differs dramatically across the sector.

Cumulatively, these provide an overview of the way that museums use websites and create a foundation and context for future studies on online collections, the analysis of text, and user surveys, each of which would be a fruitful avenue for future research.

3.7.1 Data Gathering

While websites were not the primary focus of this thesis, a consequence of the TripAdvisor pipeline is a list of museum URLs.⁷¹ The list of websites used in this study was a consequence of expanding this pipeline to the entirety of the UK. The final pipeline is documented below in Figure 3.8.

This process is a marked contrast to the pipeline used in the Mapping Museums Project (Figure 3.9) which relies on already having a list of the names of museums whose URL needs to be retrieved. As such, the TripAdvisor Pipeline has a unique utility. As TripAdvisor is used around the globe, the pipeline would be enormously beneficial for documenting cultural sectors in countries where there had not been a concerted effort – such as the Mapping Museums Project – to create a comprehensive list of museums. Most estimates for the number of museums in a given country are currently based on national accreditation schemes or membership of multinational initiatives – such as NEMO and UNESCO surveys – which bias our understanding of the sector towards larger organisations (NEMO 2020b; UNESCO 2020). The informal and unaccredited museum sector is woefully under documented, even though it likely contains the majority of the world’s museums (Candlin et al. 2019).

As the UK already has a list of museums within the country that is human validated – which is a consequence of the three years of research conducted by the Mapping Museums Project – it is the perfect test site. The Mapping Museums dataset was used to validate the results and assess accuracy. This enabled the evaluation of the pipeline and identified areas for improvement before the process was further scaled up and altered for different languages.⁷²

⁷¹URLs were also identified as part of the Mapping Museums Project methodology, however, this dataset was not shared. A description of this dataset can now be found in a paper by Andrea Ballatore et al. (2023).

⁷²This thesis focuses on UK museums, however, the adaption of the pipeline is currently underway, with Spanish and Portuguese which were chosen for their utility both in Europe and South America.

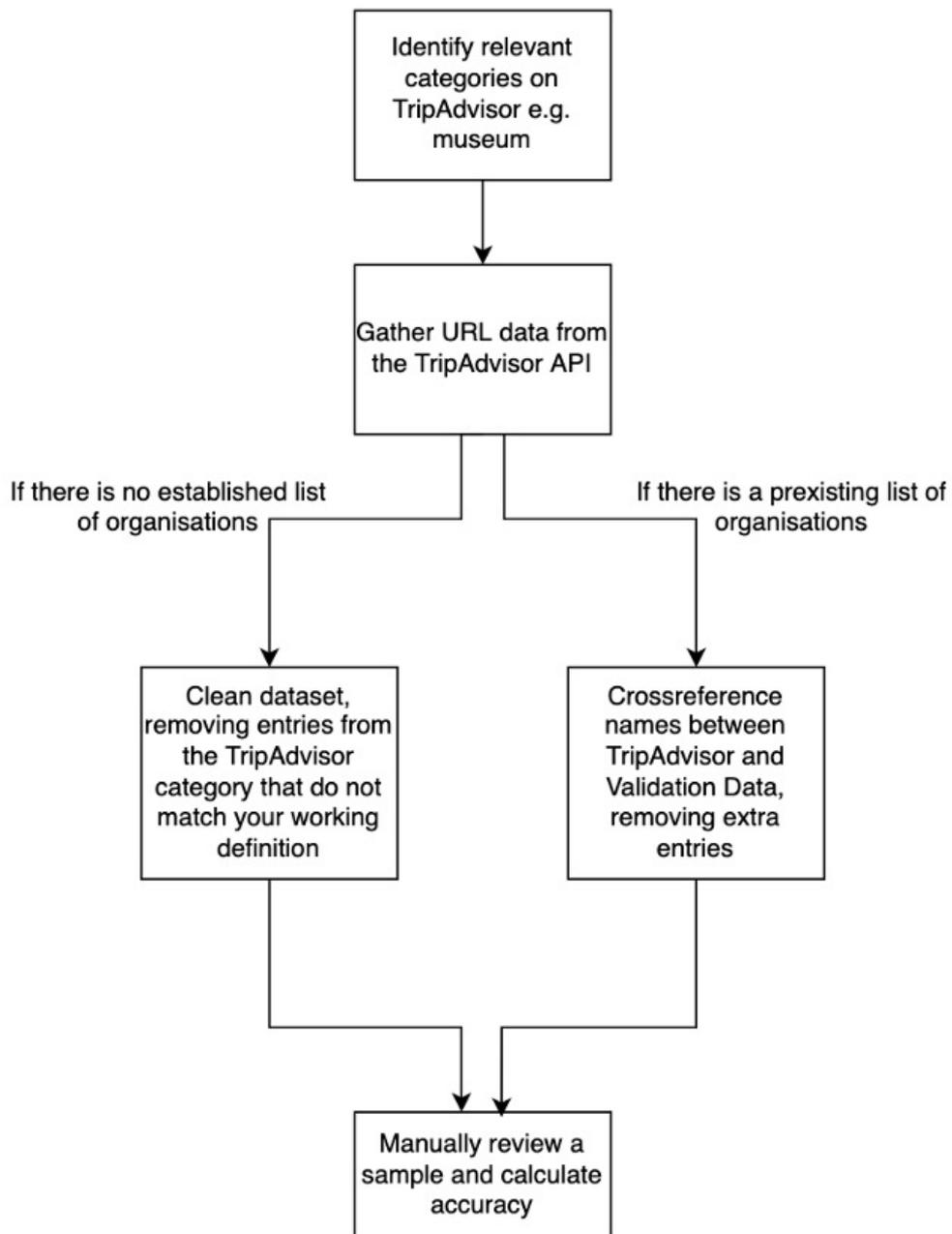


Figure 3.8: Process for identifying URLs as it is in the TripAdvisor Pipeline outlined in this thesis.

However, while the list of museums provided by the Mapping Museums Project could be used to check that the pipeline identified all of the museums, it was not

3.7.1. Data Gathering

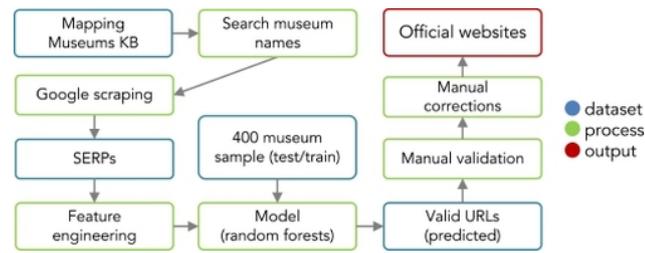


Figure 3.9: Process for identifying URLs developed by the Mapping Museums team.

able to identify whether the URLs were correct. Considering the plans to scale this methodology, the UK list of URLs was validated in semi-automatic manner. In addition to the TripAdvisor generated URLs, a Google search was also performed on the museum name using the python libraries Selenium and BeautifulSoup. In a similar manner to Figure 3.9 (the Mapping Museums pipeline), the URLs of the top five google results were then ranked. If one of the URLs matched the TripAdvisor URL this was ranked first. Similarly, if one of the URLs contained a close match to the museum name, this was ranked as the top choice.

Combing the selenium and tkinter libraries, I created an automated process and rough interface that automatically loaded a museum website, and gave the option of 'Found', 'Next Option', and a back button. If all links for a museum were iterated over without being marked as Found the URL was marked as 'Not Found'. There were few enough of these that they were then manually checked through with the full list of search results reviewed. If nothing was found, Google Maps was also searched for a website link. In this way, a number of museums that had closed but were still marked as open were identified through the presence of relevant news articles.

Only one URL was stored for each museum. As a rule of thumb, the webpage containing the most information about the museum was chosen. This generally led to the prioritisation of the smallest scale available. For example, an individual museums' webpage was chosen over the local authority webpage that may also contain their opening times. In addition, if a listing was available through the local tourist board page alongside hundreds of attractions as well as on a museum group website split between five organisations, the latter was included. However, webpages from aggregate sites such as tourist boards and the national trust websites were included when no individual page was identified. By going beyond individual museum pages, it was possible to document the types of institutions that were helping museums maintain an online presence. This generously broad definition of a 'museum webpage' enables a holistic view of the sector and enables the documentation and archiving of sources of information about museums

3.7.1.1. Accuracy

		Predicted (TripAdvisor Pipeline URL)	
		URL found	URL not found
Observed (Human validated list of URLs)	URL found	2,555 (true positives)	677 (false negatives)
	URL not found	2 (false positives)	67 (true negatives)

Accuracy = 0.794 Precision = 0.999 Recall = 0.795 Specificity = 0.971 (Rounded to 3 d.p.)

Table 3.4: Evaluation of the TripAdvisor Pipeline for identifying museum URLs

that are potentially vulnerable or transient, such as listings on larger aggregate sites.

3.7.1.1 Accuracy

Not all museums in the UK are findable online. Working from the basis of the Mapping Museums dataset's 3,327 museums identified as open during this period, 3,233 were found online in some capacity.

As honing the TripAdvisor pipeline is part of the aim of this research, great care was taken in its evaluation. Of the 3,233 museums with websites (including shared websites), 2,958 (91.49%) had a TripAdvisor page. Unfortunately, 409 (13.82%) of these pages did not have a link going to the museum's URL. The full breakdown of the results evaluating holistically the TripAdvisor pipeline's ability to identify museum URLs is provided in (Table 3.4).⁷³

It is the high number of false negatives that have reduced the overall accuracy, and means that there are many museums that have URLs that TripAdvisor does not pick up. Nevertheless, the low number of false positives means that if TripAdvisor has a link, it is usually correct, leading to high precision and specificity scores. This is even true of very small volunteer run museums that were not easily identifiable

⁷³Retrieval processes like this pipeline have four outcomes: a true positive (where the URL is returned and that is the URL), a false positive (where a URL is returned and it is not the correct URL), a true negative (where no URL is returned and the museum does not have a website) and a false negative (where no URL is returned but there was a museum website).

through a Google search – the only place false positives did occur was when the website domain had recently changed or expired.

However, this low accuracy score is a poor reflection of the pipeline, as it was using the Mapping Museums dataset as a base. Yet, the TripAdvisor pipeline identified an additional 721 museums which were not included in the Mapping Museums list. Many of these are valid entries that are in the process of being assessed and added to the Mapping Museums dataset. This highlights one of the issues of working with real world data, which is that it is difficult to establish a ‘true’ test dataset even with human validation. Including the new museums identified through TripAdvisor improves the accuracy and recall of the pipeline.

The main category where the two datasets diverge in their definition of museum is around private selling galleries. These range from community-run shops displaying the work of local artists to high-end London galleries such as the White Cube and Hauser and Wirth. Notably for these organisations entry is free, and they are open to the public, and display a range of objects and artworks. While they run on a different economic model to many museums, the visitor experience is remarkably similar. Their exclusion is also difficult to justify considering the private and for-profit museums (which includes a number of large estates) that are included in the Mapping Museums dataset. Here the crowd-sourced categories on TripAdvisor give an audience-centric definition of museums, where the emphasis is placed on the visitor experience instead of the educational goals and funding structures — attributes that are often used to define a museum within the existing literature (Fraser 2019). This draws attention to a potential divergence between public perception of museums and the prevailing perception of their role from within the sector. Despite the potential of using this wider definition of museum, for consistency between studies and to make the most of the additional contextual information the Mapping Museums dataset provides, the results of the Website Study have been limited to the Mapping Museums Project’s list of museums.

Ultimately, in terms of identifying URLs, of the 2,880 museums that had websites 79.1% of the potential URLs were correctly identified in a single step. This percentage has been significantly lowered by my choice to include websites that are shared – including local authority websites and tourist boards – in the validating dataset. Unaccredited museums are more likely to be hosted online by a larger organisation, so this helps prevent the reintroduction of bias in any future applications of the pipeline. Even with this lower percentage, gathering data directly from the TripAdvisor API is both simple and computationally inexpensive. With such a low rate of false positives, more complex techniques can be focused on identifying the remaining URLs. By scraping the Google results for each of the

remaining museums, I was able to raise this proportion significantly.⁷⁴ However, in contrast to the established methods, this only needs to be done when a link was not found through TripAdvisor, greatly reducing the computational costs and time needed to run this kind of analysis over thousands of museums.

In terms of creating a list of museums, TripAdvisor is more promising still. Of the 2,880 museums online in the UK (excluding social media), the pipeline was able to retrieve at least the name of 2,715 (94.3%).⁷⁵ This list of names would be invaluable in regions where there is not a comprehensive list already available and could then form a foundation to identify available URLs using the Google results step.

However, it should be noted that the accuracy rates for the UK are likely some of the highest in the world as TripAdvisor is predominantly an English-language platform. It is therefore unsurprising that there are 48,479 European museum pages or 24,906 museums listed in North America. If the pipeline was to be expanded to other continents, the research would benefit from additional data to validate the findings: the site only has 5,668 museums listed in South America; 2,520 in Australia; 1,657 in Africa; and the entirety of Asia has a total of 20,112 listings. Yet even these figures far surpass the UNESCO estimates of how many museums are in each region (UNESCO 2020). Ultimately, it is in combination with other data sources that this pipeline would be most useful. These could span other user-submitted data such as OpenStreet Maps, Google Reviews, and social media, to the widely used lists of accredited organisations and museums association memberships. As this methodology aims to highlight, it is through combining a number of sources and approaches that a more comprehensive understanding of the sector can be established.

3.7.2 Analysis

3.7.2.1 URL and HTML Analysis

The analysis for this study used the HTML code and URLs of museums websites in conjunction with the Mapping Museums dataset. The analysis focused on the foundational elements of the sites – how they were run and key elements they contain – and how this differs across the sector.

⁷⁴The exact degree to which this can be improved is dependent on the subjective choice of what constitutes the ‘correct’ museums website. Many museums found during this process have no clear individual website but are present on a number of umbrella or aggregator sites.

⁷⁵This rate rises to 95.4% if the additional 712 museums that are on TripAdvisor but not in the Mapping Museums list are included.

A simple approach was designed to search for the presence of collections information. Two lists of keywords were made in collaboration with a domain expert: one was words associated with collections; and the other was centred around exhibits. These were then refined based on a small random selection of examples taken from the dataset. These terms were then checked against the html and sites were categorised as having collections information available or not accordingly.

This process was developed during data collection so that validating the websites and checking for the presence of collections information could be done simultaneously. However, due to the extra time required to check for collections information manually, this was only validated from a sample of 50 museums. Due to the remarkable homogeneity of language use in the sector, simply using the word ‘collection’ or ‘collections’ was a highly accurate proxy for the presence of information about the collections being available. Of the 50 museums manually checked, only one website was incorrectly misidentified as not containing information about the collections when it was available. The lists of keywords were therefore discarded, and this simpler approach was used instead.

The advantage of taking such a broad approach is that it highlighted collections information that was in blogs, paragraphs of texts, or sophisticated databases. However, to make a rough distinction between the level of information available, I also identified when there was a dedicated page for collections information. This is not necessarily indicative of how much information is available – occasionally older museum sites will put everything on one long homepage. However, for most sites, the presence of a dedicated page correlates to there being more information available.

The online collections databases were possible to identify through the presence of submitting forms – the search bar – which require ‘method= “POST” ’ and ‘method= “get” ’. However, this also returned all of the site which enabled users to sign up for newsletters. The list was therefore refined by dropping any instances of a form where sign up, newsletter, or email were within the form’s attributes. The rest were manually reviewed, and no additional false positives were found. As such, although these can only be considered rough classifications, using the three methods in tandem, it is possible to identify sector wide trends on the availability and quantity of collections information.

Additional information about how the sites were created and run was available through the meta tags of each website, and the URLs, which were used to identify groups of museums who shared digital infrastructure. Further analyses of the text and images on the sites, or site structures were not conducted at this time, but would make an interesting avenue for further research.

3.7.2.2 Computer Vision

Thomas Schmidt et al. (2020) have previously used an analysis of HTML in conjunction with simple computer vision techniques. While the analysis was relatively limited – computer vision was only used to explore how colours of websites changed over time – it added a nuance to the analysis of the HTML and capturing a small element of the user experience. Similarly in this Website Study, computer vision is used to summarise simple trends in a museum homepages and collections pages. In short, it is used to group websites based on their overall design.

Over the course of manually validating the website dataset, I had noticed a number of trends amongst the websites, and I aimed to use computer vision to capture this experience by identifying the similarities between screenshots of the websites. For this CLIP was used– a multimodal model trained by OpenAI (OpenAI 2021a). Trained on 400 million text-images pairs, this model was chosen for its flexibility at a large range of tasks. I began by testing it straight ‘out of the box’ with a plan to fine-tune the model on website screenshots. If this did not lead to satisfactory results, the next step would be to implement one of the more recent models trained on a larger dataset, such as LAION-5B (Schuhmann et al. 2022). Dimensionality reduction was performed using UMAP and clustering with HDBSCAN (McInnes et al. 2018; Malzer and Baum 2020).⁷⁶ Aware that there was unlikely to be neat distinctions between the visual experience of museum websites, density based clustering – of which HDBSCAN is an example– was preferred (Google Developers 2025a). The alternatives, Principal Component Analysis (PCA) for dimensionality reduction, and Hierarchical clustering was also tested on the data but led to less comprehensible groupings.

This setup returned– without the need for fine-tuning – clusters that reaffirmed my own experience of the viewing the websites. These are discussed at length in the results. These broad trends became clearer when choosing parameters, especially when parameters were orientated towards the ‘global’ data structure as opposed to the ‘local’ (Coenen and Pearce 2025). However, much like the topic modelling, with no labelled data, it is not possible to evaluate combinations of parameters using a test dataset. Therefore, I manually assessed the outputs, aided by my experience of the URL validation process. This highlights one of the key issues of using deep neural networks for this form of analysis, which will be discussed further in Section 3.11.

⁷⁶UMAP is an acronym for Uniform Manifold Approximation and Projection, while HDBSCAN stands for Hierarchical Density-Based Spatial Clustering of Applications with Noise.

3.7.3 Limitations

This analysis does not present a comprehensive study of how museums are using their websites, and further research into this dataset would yield additional insight into museums digital strategies. Unfortunately, time constraints meant that I prioritised new methods– such as computer visions– that introduced more diversity into the results and were able to answer different research questions. However, applying methods such as topic modelling to this dataset, would provide an avenue for further research.

This datasets also opens up the possibility of exploring museums’ online collections in greater detail. This, however, is a significantly undertaking. Understanding how visitors navigate these interfaces and what search results return, would require extensive testing and new forms of data collection. Such work has been performed by Inna Kizhner et al. on Google Arts and Culture, who most recently conducted a similar analysis on the online collections of the Metropolitan Museum of Art and the State Catalogue of Museum Collections of the Russian Federation (Kizhner et al. 2021; Kizhner et al. 2022). To embed this kind of analysis of the way search works – including reverse-engineering ranking and retrieval algorithms– within the user experience would require a collaboration with those better versed in interface design. Further research in this area has therefore been postponed until after the PhD thesis has been completed.

3.8 Interviews

Considering the many limitations of engagement metrics, they, in isolation, are poor measures for evaluating the success of online strategies. Interviews are able to clarify organisational priorities and goals and thus add nuance to these metrics – helping identify causal processes (Maxwell 2012). In the aforementioned study of pandemic tweets conducted by Kidd et al. (2022), the researchers used interviews to gather the motivations and ambitions of cultural institutions, and 19 reflective interviews supplemented their quantitative analysis. This mixed methodology was seen to be beneficial to evaluation for both researchers and museums practitioners; ‘Practitioners were clear that more expanded and qualitative assessments such as that presented in this article would be helpful in interrogating those metrics and articulating the more subtle or expansive ways in which engagement functions’ (Kidd et al., 2022, 27).

Interviews can additionally be used to provide insight into audience behaviours. Enabling researchers to ascertain why certain things resonated with online audi-

ences and whether their reaction was a positive or negative (Villaespesa 2013). This can help address the ambiguity of whether a metric, such as a ‘like’, indicates approval, expresses discontent, or was used to aid identity-building within an online community (Ji et al. 2019). The audience agency’s interviews and surveys have explored audience behaviours over the pandemic period at a large scale. The resources required makes this impossible to replicate as a lone researcher, and while the primary focus is the financial impact of the pandemic on the sector, it provides much needed context for this thesis. The qualitative analysis was therefore conceived as a complementary study to the quantitative analysis, and similarly focuses on museums and their online strategies.

3.8.1 Approach

Interviews were conducted over a two-year duration with participants being selected from across the museums sector. Overall, 15 participants were interviewed about museums’ social media use. Each interview was conducted one-on-one over the video conferencing platform zoom and lasted 45 minutes.⁷⁷ Before the interview began, the participant information pack was reviewed, and I reiterated their rights to anonymity, that they could skip questions without stating a reason, withdraw from the study at any time, and explained how their data would be handled. With participants consent, a recording of the meeting audio then began. This audio file was saved locally at the end of each interview and transcribed using a version of OpenAI’s Whisper. This was done using python with a saved version of the model so that the audio files were never uploaded to a digital cloud or server infrastructure. The transcriptions were then corrected and anonymised, before the audio file itself was securely deleted. The computer on which these were stored was password protected, and only one individual had access to the recordings. The electronic consent forms were stored on an encrypted device.

The approach taking during the call draws from best practice procedures for ‘semi-structured’ interviews and their analysis detailed by Bill Gillham (2005),

⁷⁷As interviews were conducted in 2021 onwards, zoom had become the premier video conferencing platform in the UK and was familiar to the vast majority of participants – many of whom worked from home. However, this approach did rely on a stable internet connection and some level of digital expertise. The quality of internet connections varied, and consequently video was regularly turned off to limit bandwidth usage and stabilise the audio. One participant faced numerous difficulties with this format– a curator on a remote island in the UK they did not have access to a computer or the internet. In this case, the participant information pack and consent form was sent and returned via postal delivery. A phone call was organised; however, it was postponed due to storm damage on the island and prolonged disruption to the electricity supply. As a result, they were unable to charge their phone and chose to preserve the battery in case of an emergency. The interview was eventually conducted and gives a valuable insight into museums with limited digital resources.

Karin Olson (2011), and Herbert and Irene Rubin (2012). The semi-structured interview presented a compromise that would not unduly limit the participants' descriptions or ability to tell a narrative, while simultaneously keeping the interview focused on key topics (Olson, 2011, 36; Gillham, 2005, 75). This posed a significant advantage to structured interviews, as I was able to pose follow-up questions or prompts to clarify or expand on participants answers as needed.

The questions were refined significantly in the first two interviews, which acted as a pilot stage (Gillham, 2005, 73-75). Annotation was also conducted at this stage to troubleshoot issues that may arise during analysis. On reflection, the broad range of topics that had curtailed the depth on each interview and posed a potential issue for further analysis and comparison between interviews (Gillham, 2005, 76). The questions were changed accordingly, but this process of refinement continued throughout the entire interview process – both in response to participants and shifts in the analysis and data.

This refinement, combined with the follow-up questions, resulted in participants being asked different questions, complicating the analysis (Olson, 2011, 36). In this case, the transcripts were annotated by hand and were first divided into topics. Codes– both *in vivo* and my own– based on events, examples, concepts, themes, and topical markers were then highlighted (Rubin and Rubin, 2012, 192). The codes were then grouped (Olson, 2011, 76). These larger clusters were then also grouped where appropriate, creating a hierarchy of categories (Levitt, 2021, 62-65). After each interview, I returned to the code groupings, data, and revised or refined my hypothesis as necessary (Rubin and Rubin, 2012, 208).

Ultimately, the broad research topic of this thesis – which charts how an entire sector has changed over the course of three years – is broad enough that a 'universal solution', as it is used in grounded theory, would be the work of a lifetime. However, by adopting this process, nuance was added to the quantitative findings and new avenues of inquiry emerged. The code groups that emerged during the interviews and the links present a new side to the data, and it is this that will be discussed at length in the following results chapter. Throughout, I have endeavoured to contextualise these quotes, and to not emphasise commonalities to such an extent as to mask differences (Levitt, 2021, 32-34). This is especially important as museums across the sector differ and I aim to establish for which institutions certain findings hold true (Levitt, 2021, 34).

3.8.2 Sampling

As the interviews were designed to test the reliability and validity of the quantitative methods, they are best described as mixed-methods study with a qualitative drive, characterised by a convenience driven – rather than representative–sampling (Olson, 2011, 38). However, it remains true that the usefulness of interviews is often hampered by the small number of responses. To mitigate these effects, participants were selected in three stages:

1. In the first stage, the distribution of different types of museums in the Mapping Museums dataset were studied (p. 64). At least one interview was organised within each country within the UK – which excludes the Channel Islands. In addition, a range of museum sizes were also represented. This step was designed to ensure a minimum level of coverage across the wide range of museums in the dataset.
2. After the quantitative analysis was conducted and trends in the data identified, additional participants were contacted to ensure that museum types of particular interest were included. This included transport museums, military museums, and museums in rural Scotland (pp. 166, 160). Here participants were not chosen for how well they represented the broader dataset, but because they were likely to have an under-represented posting strategy or following. This was done to provide a range of insights and gather as many different perspectives on social media use as possible.
3. As mentioned in the discussion of grounded theory, new information provided in interviews was cross-referenced with the data to look for quantitative evidence of participants' experiences. In this way, theories of how and why certain trends emerged were refined over the course of the research. The final round of interviews was therefore used to follow-up on these revised theories. And participants were chosen for their expertise and likely experience of these trends– for the first time in the study, this also included those working outside of the confines of an individual museums.

Participants were initially contacted via professional emails listed on the museum's website. Where this was not possible, the museum's email for general inquiry and information was used. While a broad range of participants were interviewed as part of this research, response rates were generally poor, in part due to the time-consuming nature of interviews. This limited how many practitioners are willing to participate, with the most stretched museums being unable to make time in staff

3.8.2. Sampling

Participant (P)	Participant Role	Collection	Size	Area description
1	Digital resources manager	Science	Large	Cosmopolitan
2	Marketing and communications officer	Industry	Medium (museum group)	Sparse Welsh countryside
3	Treasurer (volunteer)	Social History	Small	Scottish countryside
4	Trustee (volunteer)	Local History	Small	English countryside
5	Communication coordinator	Industry	Large	English region with manufacturing legacy
6	Experience and engagement lead	Fine Art	Large	University town/ city
7	Site manager	Local History	Small	Costal region with aging population
8	Marketing and communications manager	Religion	Medium	English university town/ city
9	Curator (interim)	Archives	Medium	Scottish countryside
10	Collections manager	Transport	Small	Affluent English rural region
11	Co-manager (part-time)	Mixed	Large	Larger towns and cities, Northern Ireland
12	Assistant cultural heritage officer	Mixed	Small (museum group)	Scottish countryside

Table 3.5: Interview participants with details of their museum’s collection, size, and area.

schedules. If two emails a month apart were left unanswered, a different museum sharing the same characteristics was contacted.

Response rates were not necessarily correlated to a museum’s size – many of the smallest museums run by volunteers or a single member of staff were happy to participate and have their work recognised. There was also a high response rate from museum groups, as social media resources and roles are often centralised resulting in a team of dedicated staff. In contrast, huge, large, and medium museums that were not part of large museum groups often did not respond. Where they did, often staff members would suggest that while they did not have the time, perhaps a colleague did. Unfortunately, this resulted in being passed around various departments, but not an interview. Email inquiries from huge museums also proved ineffective, with polite declines or automated email response. These would often cite the high number of inquirers and prioritisation of affiliated researchers. The digital teams at huge museums are, however, far more likely to release reports, publications, blog posts, and prior interviews about their strategies. These documents help mitigate their absence and considering both time constraints and the small number of huge museums in the UK, their exclusion.⁷⁸

This process resulted in 15 interviews focused on social media use, and the anonymised descriptors of each participant are detailed in Table 3.5. Drawing from grounded theory, I ceased conducting interviews at the point at which new insights were no longer being generated, which is referred to as the point of ‘theoretical saturation’, as no unique concepts had emerged in the final three interviews (Rowlands et al. 2016).

⁷⁸To provide a point of comparison, there are more museums in the channel island than huge museums in the UK. Both groups represent less than 0.6% of the total museum population.

3.8.3 Questions

A major advantage of interviews as opposed to surveys is the flexibility it offers researchers, providing the opportunity to follow-up on responses. Therefore, while a list of questions was used as prompts, free-flowing discussions was permitted. The primary goal of first section of the interview was to establish:

- The role participants played in their organisation
- The relationship between their work and the broader organisation
- Digital strategies and social media practices (including frequency and ambitions)
- Methods of evaluation
- Notable successes and failures (by their own metrics or ambitions)
- The impact of Covid-19 on their work
- Their understanding of social media use in the wider sector
- Aspects of their work and its reception that had surprised them

In addition, participants were encouraged to providing concrete examples where possible. In the last section of the interview, new topics that directly addressed findings in the quantitative research were introduced. These vary between participants, both according to their expertise and at which stage in the research they were interviewed. These included:

- The social media following of transport museums
- Posting about conflict and war
- Changing posting frequency over the duration of the pandemic
- Types of posts that receive the most engagement
- Posts as a vehicle for advertising and the efficacy of calls to action
- The differences in reception between collection and advertising posts

So as not to unduly influence participants, the quantitative findings were not initially shared, instead, the topic was raised, and participants would contribute their opinions and personal experiences before the data was discussed. At the end of each interview, ten minutes was provided to share key findings and trends most relevant to each participant and their interests.

3.9 Ethical Considerations

3.9.1 Social Media Data

The increasingly ubiquity of social media platforms has encouraged researchers in museum studies to turn to online data collection methods. Currently, gauging the extent to which different audiences engage with a post is made possible through the aggregated and anonymised data provided by social media platforms (Van Der Vlist et al. 2022). Yet, using data from these digital platforms presents multiple ethical challenges to researchers who must navigate— at times conflicting— commercial, academic, and public interests. The companies that own social media sites have so far justified data collection— at least until recent legal proceedings— under ‘legitimate interest’, which users consent to when they agree to the site’s terms and conditions (Obar and Oeldorf-Hirsch 2020; Fouche 2023).

The most recent 2020 guidelines from the Association of Internet Researchers, acknowledge that Big Data researchers must look ‘beyond informed consent’; as it is ‘manifestly impractical’, if not impossible, for researchers to obtain permission from thousands of anonymous or pseudo-anonymous participants (AoIR 2019). While researchers are encouraged to minimise the risk to individuals by anonymising data sets and ensuring personally identifiable information is not shared, the Norwegian National Committee for Research Ethics in the Social Sciences and the Humanities (Staksrud et al. 2019), published in 2019 guidelines that instead take a relational perspective (Staksrud et al. 2019). The guidelines highlight that ‘not all information openly available online is public’, and they centre the ‘distinction between public and private’ as the key ethical consideration for researchers that allows them to navigate the lack an inability to obtain informed consent (Staksrud et al., 2019, §Distinction between public and private).

This is particularly difficult to navigate as while posts on a social media platforms may be freely available, participants publishing on these ‘public or quasi-public fora’ often have expectations that this information is private (AoIR, 2019, 7). Those working with the data must ‘take a personal responsibility for assessing the appropriate criteria for reasonable expectations of publicity’ (AoIR, 2019, 8). In absence of informed consent, this distinction between private and public information is key in protecting participants’ autonomy and equality (AoIR, 2019, 11). To this end, the NESH guidelines emphasise the ‘context in which the information exchange or communication takes place’ in enabling researchers to make this distinction’ (Staksrud et al. 2019). Researchers are then encouraged to reflect on the expectations of participants and the context of a post (AoIR 2019; Im et al. 2021), a task

rendered difficult when a study spans multiple online communities with different communication norms. To complicate matters further, researchers are unable to shape what data is collected on third-party platforms and are unable to implement their own values and ethical practices. As Blake Halliman et al. summarise, ‘Ethical considerations for platform-based research often begin from the terms set by the platforms themselves’ (Hallinan et al., 2020, 1088). With most platforms adopting a ‘take-it-or-leave-it’ approach to consent, researchers face the same difficulties exercising informational self-determination as individual participants (Custers et al., 2013, 456). On most major platforms there is no ability for participants to opt-out of particular features, or control the way their information is used. Automattic, the company that owns Tumblr and Wordpress and styles itself as ‘making the web a better place’, simply states ‘If you don’t agree to these terms, don’t use our services’ (Automattic 2022). For the majority of platforms users cannot control data permissions in detail, and cannot opt-out of their data being used for research. Researchers are similarly caught between wanting to use platform data, and the inability to design their own ethical privacy practices; information retrieved from application programming interfaces is collected and stored by the social media platforms themselves. Researchers have no influence over that process.

These difficulties culminated in the decision to focus on institutional accounts when collecting social media data – ignoring data that may be available on the accounts of individuals who make up the audience. This also extends to their comments, which have not been analysed within this thesis. A public context is not clear on museums’ Facebook pages, which often have very small local followings. Commentors regularly write deeply personal – and de-anonymising– information in comments. This is a very common in responses to posts about local histories and transport, which can inspire personal reminiscences about individuals’ childhoods, personal identity, or family history. Therefore, despite the wealth of qualitative information and additional information about engagement that comments provide, they have not been used in this research.⁷⁹

3.9.2 Network Analysis

In performing an analysis at a post-level, concerns around comments and de-anonymizing individuals were more acute, although a new concern was raised in the

⁷⁹It should also be noted that although museums commonly attempt to demographically group their audiences, race, political opinions, and the sexuality of individuals are considered sensitive data – requiring special handling– within both European and UK regulations (Williams et al. 2017; Andreotta et al. 2022; Information Commissioner’s Office 2024; European Commission 2025).

network analysis of museums Tweets.

Museum curators will often use their own personal Twitter accounts for public events. This in part humanises the institution, and beneficially highlights the subjectivity of curation. Yet, it can put individual staff members at risk. This was the case of the Twitter controversy sparked by Manchester Museums' removal of the *Hylas and the Nymphs* from display to highlight female voices. Maria Paula Arias' (2020) analysis of the Twitter response charts the way that the curator – through their personal account – became the spokesperson for the project, while the museum's official account remained silent. This resulted in hateful comments being levelled not at the institution, but an individual. I am therefore cautious of spotlighting individual accounts and increasing the risk to individuals, especially as I am not an active user within a given community and am therefore not familiar with its communication norms. Therefore, while the information surrounding these individual's Twitter account could be reasonably considered public, they have been excluded as they cannot be discussed anonymously – links within the network graph to named institutions would quickly make it apparent who they are. As this is only true of a handful of individuals, informed consent could be sought from those still active within their original organisations or the wider museum community. However, to complicate matters further, many of these accounts have been deleted in the wake of Elon Musk's takeover of the platform and the perceived increase in extremist language on the platform (Jikeli and Soemer 2023). Abandoning the platform was a regular topic of conversation within multiple professional newsletters and museum networks (Vaughan 2024; Dawson 2025). As such, accounts of individuals have been excluded from the study entirely.

3.9.3 Interviews

The interviews for this study has received ethical approval from the Ethics Committee of the School of English Studies at Durham university in addition to the supervisory team. The university's research ethics policy was followed throughout, and the risks to participants– although considered low– were minimised. Anonymity was maintained to enable participants to speak freely about their organisations without the fear of negative consequences or reprisals. In the transcripts and all consequent quotations, organisations and projects were altered to make them unidentifiable, e.g., 'a local authority run museum in a rural area', or 'online exhibition hosted on Google Arts and Culture'.⁸⁰ To maintain the anonymity

⁸⁰As multiple participants voiced a willingness to waive their anonymity, this decision to maintain anonymity for all participants was considered at length. The advantages were ultimately twofold. By keeping interviews anonymous, participants were able to talk without feeling as though they had

of interviewees, none of the highlighted examples within this thesis centre the organisations of participants.

Ahead of the interview, participants were provided a pack, containing information about the project, a privacy notice, and consent form. This detailed participants right to anonymity and withdrawal, and explained how their data would be handled.

For the comfort of participants, three recommendations suggested by Bill Gillham for 'élite interviews' with advanced practitioners was followed and each participant was offered: the right to anonymity; the destruction of the original recording; and the chance to review edited quotations for publication (Gillham, 2005, 55). Gillham also suggests giving participants the chance to review the transcripts. However, due to the fact that large swathes of the transcript will not be used, to respect participants time, they were only asked to review the outputs of the research.

3.10 A Notable Omission

In addition to these studies, it was originally planned to do run a case study in collaboration with a museum. This would have enabled the collection of different forms of data including on-site visitor numbers, website visitor numbers, ticket sales, and most crucially the ability to track online visitor's journeys across a museum's social media posts and website. This could help answer the question of whether museums' online activity impacted on-site visitor numbers, which is crucial to many museums and arose a number of times during the interviews.

With this plan in mind, I worked in collaboration with a digital advanced medium sized museum who gave me access to the ticketing, social media, website, and on-site survey data. It quickly became clear that an individual museum produces a relatively small volume of data. As is average for their size, most of their social media posts did not receive many interactions, and they only posted once a week. In addition, their website received few enough visitors that there was a notable jump when I started my analysis, as I repeatedly check the pages to reference against the Google Analytics dashboard.

to use the interview to advertise or showcase their institution or work or stick to strict talking points. Secondly, assured anonymity enabled participants to speak candidly about their work, institution, and the wider sector without fear of the consequences. The confirmation of anonymity seemed to reduce hesitancy amongst sharing data and less positive stories – even amongst those who had initial offered to waive it.

Despite this, as they had over five years of data stored, I hoped to mitigate this issue and explore whether their social media posts had had a tangible impact on on-site visitor numbers. However, the initial analysis was further plagued by the poor data quality. A relatively high staff turnover had led to the frequent switching between third-party tools and digital platforms – where each individual had used what they were most familiar with from previous roles. The result was a patchwork of different subscriptions and purchases – of which some were paid for but not used at all – and a mess of data. The way that online and on-site visitors had been recorded changed regularly, and data was often lost in the changeover.

Even with extensive pre-processing to merge the different data sources, it was far from a comprehensive dataset. It was likely as a result of this, that no statistically significant correlation was found between website visits, social media engagement, and ticket sales. Considering the limitations of the data, this absence is far from conclusive. I therefore worked with staff at the museum to build a simple automated data collection pipeline and reporting dashboard that will in the future mean that they have consistent data to analyse. This standardised approach is now in use and will be revisited after it has been in operation for a year – the beginning of 2026. Having high quality data for this length of time will enable a wide range of social media posts to be included in the dataset and help answer whether there is a correlation between social media engagement, website visits, and on-site visitor numbers.

This process has encapsulated many of the barriers that museums face when trying to grow their online presence: from staff leaving; to poor data; changing digital strategies; or a lack of expertise. In a parallel to the analysis performed in this thesis, it highlights the utility of bringing together data from across multiple museums to identify patterns that are difficult to see in the data from a single museum. In the future, an analysis of the visitor and online data from multiple museums would be a fascinating area of study and would help indicate whether posting online really does increase visitor numbers.

3.11 Embeddings and Humanities Data

Over the course of this research, evaluating the outputs of neural networks – as was the case with both topic modelling and computer vision – was a reoccurring issue. The sheer number of choices a researcher is presented with when training a neural network, means that judging which of the options is best is paramount. Especially as the outputs of these models can vary so dramatically. Small al-

terations to a few parameters can dramatically change the visualisations created (Figure 3.10).

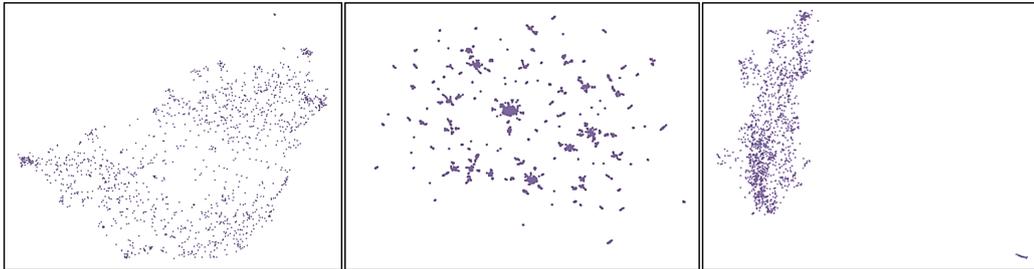


Figure 3.10: Visualisations of the embeddings of screenshots of museums’ homepages, when using different parameters during dimensionality reduction.

In many applications this variability is not an issue. When there is a discreet task, a test dataset can be used to evaluate the performance of models trained with different parameters. An example might be attempting to replicate the categorisation found in an existing library system, so that new books could be automatically classified. The model’s ability to group texts in a way that is useful can be tested against the existing categorisation. The better a model is able to correctly predict which category a book is already in, the better the choice of parameters were. This provides a simple number that can be used to quickly compared models.

However, in the digital humanities, the outputs of such models are often used in more exploratory way, and for many of these common applications— such as the two examples from this thesis— there is not a test dataset. Labelling the data is made difficult if the number of topics or clusters is not predefined.⁸¹ For example, it is unclear whether a tweet about trains would be in a broad ‘transport’ topic or a smaller ‘trains’ topic. Without more information about how many topics there will be, creating a labelled test dataset is difficult.

Researchers have primarily responded in two ways. The first solution is to use a evaluation metrics. Topic coherence, topic diversity, Davies-Bouldin Index, and silhouette scores, are measures of the distance between clusters, whether they overlap, and how dense each cluster is (Suraya et al. 2023; Murugaraj et al. 2025). The difference between ‘good’ and ‘bad’ clustering is summarised in Figure 3.11, which shows two different ways that the same data points can be grouped. Based on these metrics, a good model is one that results in clusters being far apart and very dense.

⁸¹To avoid confusion in this section, it is useful to remember that topics in this context are clusters. Each point in the topic represents one text or document, and a topic is merely a collection of texts or documents, not the words within them. In this way, the use of ‘topic’ in topic modelling differs slightly from the general use of the word.

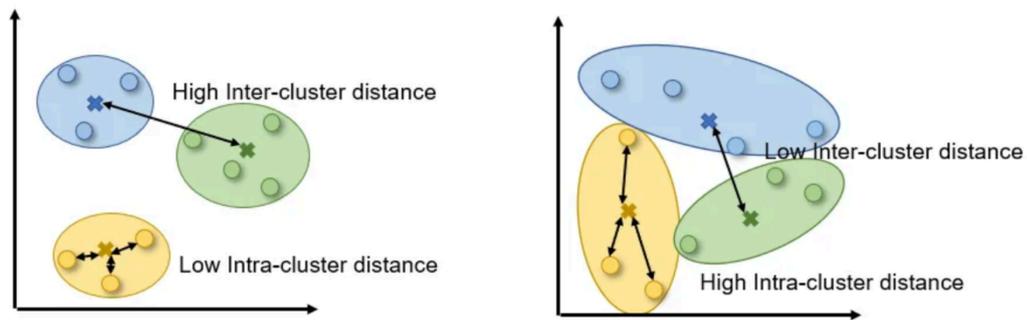


Figure 3.11: Good (left) versus bad (right) clustering based on the inter-cluster and intra-cluster distance, created by Jonte Dancher (2022).

The problem is that these metrics are not related to the actual data or informed by what the researcher is hoping to achieve. For example, it might be useful to have separate clusters for tweets about ‘War’ and ‘Immigration’ despite the fact that there might be a high degree of overlap between the two. In addition, when working with humanities data in particular, edge cases are often of particular importance, highlighting signs of connections and change. Yet, these nuances are not valued in these metrics, and if researchers were to optimise for them, would be erased entirely. In the 2D clustering example (Figure 3.11), while the clustering algorithm can change, the points remain the same.

However, as we see in Figure 3.11 this is not always the case when working with neural networks, where the output can change dramatically depending on the parameters chosen.⁸² This variability exacerbates the extent that optimising ‘good’ clusters would shape – and potentially diminish – the outputs and our interpretation of them.

There is, however, an alternative. Many researchers either use domain expertise to assess various parameters and choose those that are more ‘comprehensible’. This solution is better able to preserve nuance. However, as there is so much variety in the outputs, it is easy to inadvertently optimise a model so that the output aligns to preconceptions of what it *should* look like. The many other outputs, which may support alternative– even contradictory– interpretations, are effectively discarded. This means that researchers are more likely to reinforce the established narrative about a topic, as the outputs that replicate this model are deemed to be better or more ‘comprehensible’. Furthermore, as it is not common practice to present these alternative outputs to others in papers, it is impossible to evalu-

⁸²A full explanation of embeddings spaces and the nuances of dimensionality reduction is outside of the scope of this thesis. However, this section attempts to convey the issue without requiring readers to be familiar with these concepts.

ate the decisions made by a researcher during the optimization of parameters, presenting a barrier to methodological transparency.

These complications have been a contributing factor to why alternatives to topic modelling were provided in the Population Study, and why transparency and explainability have been prioritised throughout. However, over the course of this thesis, two potential solutions have emerged that may help inform the choice of parameters.

The first would be to help researchers better visually communicate the uncertainty inherent within the visualisations that result from this process. The most recent iteration of Gephi – a piece of software for network visualisation – for web browsers, enables users to run multiple algorithms to cluster nodes. In order to assess the differences between the outputs, the nodes are colour-coordinated, with more saturated colours being used for nodes that are always in the same cluster – no matter which algorithm was used – while nodes that change clusters are desaturated. The result is a clear visualisation of the confidence with which the categories were created. If we applied the same logic to the representations of vector embeddings, we could identify how many of the neighbouring texts to a given text embedding change when we use different parameters. This would give some sense of how ‘stable’ the similarity and distance are when parameters change. This idea is only in early development, but is a promising avenue of exploration to help improve methodological transparency, and would be widely applicable to a number of different types of projects that use neural networks.

The second potential solution is more direct and aims to enable researchers to label data for evaluation. In neural topic modelling, this labelling is difficult without a predetermined schema or a specified number of topics. However, this is also a problem in computer vision tasks. In an article by Jiang Wang et al. they highlight the utility of showing annotators a pair of images. The pair is then labelled as either the ‘same’ or ‘different’ by human annotators (Wang et al. 2014). The same relational logic could be used to create a test dataset for applications such as BERTopic. To take the tweets dataset as an example, a human annotator would be presented with two tweets and asked to say whether they are the same topic, or different topics. Through repeating this task, a test dataset would be created that could help the evaluation of topic models. Similar texts can be checked to make sure they are in the same cluster, while the inverse should also be true with texts labelled as different in separate clusters.⁸³

⁸³Nuance could be added through the inclusions of a slider so that two texts could be very close, or very distant. In addition a preliminary clustering could be performed so that annotators are given a range of similar and distant pairings to streamline annotation process. This and a number of improvements to the process will be trialled during development.

Ultimately, both of these solutions aim to help improve methodological transparency and make the interpretation of these representations of embeddings more accessible.

Chapter 4

Results

The results are divided into six sections: the Pilot Study; the YouTube Study and case study; the Population Study; case studies; and interview responses. This structure replicates the chronological order in which the studies were conducted, as each was shaped by the limitations and findings of the previous approach. As such, there are a number of recurring themes that emerge throughout this chapter – bias, museum size, resource management, and mediating algorithms – which will be drawn together in the discussion).

4.1 Pilot Study

The Pilot Study explores the accredited UK museum sector across five social media platforms: Facebook, Twitter, Instagram, YouTube, and TikTok. Using a representative sample of 315 UK museums, it was – when first published in 2023 – one of the largest analyses to date of museums’ social media (Charlesworth, Beresford, Warwick and Impett 2023). Designed to test the data collection methodology, this Pilot Study provided the foundation for the significantly larger Population Study. As such, it was used to identify basic trends and develop hypotheses for further testing across the entire sector.

The exploratory approach of this study was guided by a single research question. How has Covid-19 impacted the way museums use social media and the way people engage with culture online?

In order to answer this question, the study aims to do the following:

- Establish trends in social media use across a wide number of social media platforms.

- Identify the relationships (if any) between social media platforms.
- Estimate general levels of social media use.
- Estimate general numbers of followers across UK museums.

The considerations and decisions that shaped the data are detailed at length in the methodology. Although this first study is smaller in scale than the second, it provides a valuable insight into a broader range of platforms – not feasible at a large scale – providing additional contextual information for the later investigations.

4.1.1 Levels of Social Media Use

Facebook proved the most popular platform and 85.7% of museums had their own Facebook page, even in the absence of their own website. Usage of Twitter is slightly lower at 74%, followed by Instagram, YouTube and then TikTok.

Initially, the stark difference in uptake between platforms was surprising. All social media platforms present a similar barrier to entry – each require access to the internet, an email to sign up, and users to navigate similar interfaces. However, as Facebook was for many years the most popular social media site in the UK – both amongst museums and the general population – it is likely museum practitioners were most familiar with the platform and its conventions. Museum practitioners also regularly share experiences. Once a few organisations had established accounts, familiarity with the platform and its widespread use likely reduced the perception of risk associated with posting on the platform, especially in the face of such large potential audiences (p. 218).

This trade-off between risk and reward was raised by interviewees and helps contextualise the low levels of uptake on TikTok.⁸⁴ Only 22 museums (7.0%) had a presence on the platform, and most of these accounts are inactive. TikTok – alongside the other products of its parent company ByteDance – initially gained popularity in Europe and the US amongst young teenagers, especially girls (Schellewald 2023; Herman 2019). Famous for its viral dances and sometimes dangerous challenges, it is a controversial social media platform and is acknowledged to pose a ‘unique challenge’ to museums by Tim Deakin (Deakin 2022). Both the youth of the platform and its userbase, mean that it is less well

⁸⁴Other contributing factors to this figure, such as the perception that the platform rewards regular uploads, are explored in the interviews (p. 223).

4.1.1. Levels of Social Media Use

		% of museums using each platform separated by country				
Country	Total Number	Facebook	Twitter	Instagram	YouTube	TikTok
England	237	89.5	79.7	61.6	49.8	7.6
Scotland	47	74.5	55.3	44.7	34.0	6.4
Wales	19	78.9	63.2	57.9	42.1	5.3
Northern Ireland	8	62.5	50.0	62.5	25.0	0
All UK	315	85.7	74.0	58.1	45.7	7.0

Table 4.1: Museums’ use of social media platforms separated by country.

understood amongst museum staff than Facebook, and has yet to shirk early pre-conceptions of the site as a place for dance and challenge videos amongst those who do not use it.

However, it should be noted that the data for this study was gathered in 2022, and there has been a significant increase in interest from museums. This appears to have been sparked by the standout success of a few high-profile museum accounts – such as the Black Country Living Museums, who have in over 2 million followers and almost 22.8 million likes in 2025 (Charr 2021; Black Country Living Museum 2025). Nevertheless, it is still not widely used in the sector. As Jim Richardson (2024) notes, even now, it is perceived as ‘an odd choice for a museum’.⁸⁵ TikTok has been excluded from the visualisations in this study, as subdividing that 7% of the sample by museum size, subject matter, or country, would result in high variability.

Table 4.1, explores how the use of different social media platforms varies across the UK.⁸⁶ This table highlights that there is a higher uptake of social media platforms in England than the rest of the UK. As seen in Table 4.1, almost 90% of English museums have Facebook, compared to just 62% of Northern Irish museums – a drop of a third – and a similar discrepancy is also found on Twitter. Overall, English museums have the highest uptake across all social media platforms, generally followed by the Welsh, Scottish, and finally Northern Irish Museums.

⁸⁵The difficulties of navigating TikTok will be discussed at length in the interviews and consequent discussion (p. 223).

⁸⁶Notably within Tables 4.1 and 4.2, both the Channel Islands and Isle of Man – which are represented by two museums each – are excluded from the table as percentages would be uninformative for such a small sample. Therefore, the total number of museums within the UK is higher than the number represented by England, Scotland, Wales, and Northern Ireland.

4.1.2 Umbrella Organisations

These differences between countries also became evident in the discrepancies between the reliance on larger – or umbrella – organisations. As a byproduct of identifying the social media accounts of museums, the URLs of their websites were also identified. Of the 315 sampled museums' websites, 134 (42.5%) were hosted by a larger umbrella organisation.⁸⁷ Museums that shared a domain are disproportionately likely to be Scottish, or Northern Irish, while the latter are also disproportionately likely to have no web presence of their own (Table 4.2).

Country	Number of museums in sample	% of sample	Number of museums with shared domains	% of each region with shared domains	Number of museums without own web presence	% of each region without own web presence
England	237	75.2	89	37.6	18	7.6
Scotland	47	14.9	28	59.6	12	25.5
Wales	19	6	7	36.8	4	21.1
Northern Ireland	8	2.5	6	75.0	4	50.0
All UK	315	100	134	42.5	38	12.1

Table 4.2: Reliance on umbrella organisations for domains and social media channels compared by country.

A similar number of museums were exclusively represented by an umbrella organisation on at least one social media platform, while 12.1% of museums had no social media presence of their own on any of the platforms studied (Table 4.2). This figure drops to 10.8% for those that also did not have their own website – a disproportionately high number of which are run by a Local Authority (50%). Museums – likely because of the associated cost of a website – are more likely to have their own social media than their own website, although there is difference between platforms (Table 4.3). Museums are three times more likely to have a YouTube account if they are not part of a larger organisation. 144 of the 315 museums had dedicated YouTube channels, while a further 90 were represented by the YouTube channel of an umbrella organisation or group.

Therefore, while umbrella organisations provide a host of benefits, including centralised infrastructure, better brand recognition, and the pooling of digital resources, it is clear that a number of independent and small museums are experimenting widely with digital platforms in an effort to reach audiences online.

The difference in funding and structures between countries, may have inadvertently exacerbated the differences between levels of digital adoption across the UK. Scottish museums were found to be far more likely to rely on umbrella organisations (Table 4.2). However, in this Pilot Study, a social media account was only included if the majority of content on that account was about museums. This

⁸⁷This refers exclusively to the 315 museums included in the Pilot Study, however, the websites for over 3,000 museums are explored in more depth in the Website Study.

4.1.3. Inequality in the Museum Sector

	Total Number	% with Facebook	% with Twitter	% with Instagram	% with YouTube	% with TikTok
Hosted museums	134	70.9	53.7	36.6	20.1	0
Independent museums	181	96.7	89.0	74.0	63.0	12.2
All museums	315	85.7	74.0	58.1	45.7	7.0

Table 4.3: Use of social media platforms between museums hosted by a larger umbrella organisation and those with their own online presence.

included museums groups, such as Liverpool Museums, but excluded the vast majority of Local Authority social media accounts which generally post about a broad range of services – ranging from bin collections to charity fundraisers. While this method is an honest reflection of the amount of museum content available on a platform, a slightly larger proportion of Scottish museums would have been deemed to not have social media compared to their English counterparts.

This highlights how difficult it is to unpick some of the variables. Of the four largest countries – England, Scotland, Northern Ireland and Wales – England has the highest proportion of huge, large, and medium sized museums. This complicates the interpretation of the different levels of social media adoption in the UK, as it is difficult to distinguish to what extent social media adoption reflects the resources available, or whether the differences in digital adoption between countries reflects differences in digital strategies, organisations structures, or funding priorities.

4.1.3 Inequality in the Museum Sector

Having established which platforms museums are using, a benchmark was created to understand the average size of a museum’s audiences on each. However, in order to do so, it is necessary to address the distribution of the data, which affects how we calculate this average. As highlighted in the methodology, the number of followers museums have is extremely skewed to the left with a long tail (p. 68). This is evident looking at the breakdown of the number of followers on each platform shown in Table 4.4.

		Minimum	Q1	Median	Q3	Maximum
Number of Followers	Facebook	3	1,100	3,016	7,643	440,741
	Twitter	10	854	2,472	5,376	2,000,000
	Instagram	4	867	1,754	3149	2,000,000
	YouTube	1	11	47	405	520,000
	TikTok	3	39	134	1,369	1,300,000

Table 4.4: Number of followers on each platform (calculated using closest observation).

Table 4.4 highlights that museums have more followers on Facebook than the other social media platforms.⁸⁸ The demographic makeup of each platform's user base likely contributes to this trend.⁸⁹ Two thirds of Facebook users are 35 or over, just over half of TikTok's (52%) UK visitors are between 15 and 34 (Ofcom, 2021, 32; 2022b, 59-60)). At the time of this study, the user-base of these platforms is relatively evenly distributed between women and men and was within a 2% difference for all platforms (Ofcom, 2022b, 60)).⁹⁰ Facebook users tend to skew older, which overlaps with museums traditional visitor-base (Walmsley et al. 2022). This raises the question of to what extent the success of museums is attributable to their communication strategies, and to what extent museums success is based on how well their existing visitor demographic overlaps with that of the platform they post on.

4.1.4 Correlation Across Platforms

These differences in users are partially a result of specific viewing habits, modes of interaction, and communities on each platform. Initially, each specialised in a particular media: Facebook was the home of longer text, while Twitter had a character limit; Instagram was predominantly photo-based; and YouTube was a video sharing site. However, increasingly social media platforms – motivated by the finding that video content is the most effective at increasing users' time on the site and clicking behaviours (Pletikosa Cvijikj and Michahelles 2013; Moran et al. 2019) – have begun prioritising to short-form video content (Meese and Hurcombe 2021; DeGuzman 2024).⁹¹ This will be discussed at length in the interviews (p.

⁸⁸This is more notable for the fact that there are a higher number of museums with Facebook accounts – including small independent museums with small followings – which we would expect to reduce the median overall. However, this affect may be counteracted by the fact that Facebook is the platform on which museums have the highest proportion of *active* social media accounts – as inactive accounts with very few followers would bring down this average. This trend is discussed further in the population study, where additional detail on whether museums had active or inactive accounts has been included.

⁸⁹The attributes of social media platforms' users is the focus of both corporate interest and many studies in the social sciences, and will be used to contextualise results for each of the studies (Blank and Lutz 2017; Sloan 2017).

⁹⁰These figures do fluctuate over time. Notably between Ofcom's 'Online Nation' reports in 2021 and 2024 there was a significant increase in gender divisions on social media platforms. The percent of female users rose from 52% to 61% on Facebook, 54% to 64% on Instagram, and 55% to 62% TikTok. Meanwhile on Twitter, now X, the percent of male users rose from 52% to 63%, and on YouTube increased from 51% to 56% (Ofcom, 2022b, 60; 2024b, 44). While Ofcom have published difference in online habits between genders, an exploration of how the genders have become increasingly segregated in online spaces is a fascinating topic, however, it is outside the scope of this thesis (Ofcom 2024a).

⁹¹This shift became more pronounced over the course of this research, with Instagram's reels being released in August of 2020, and YouTube shorts following in September of the same year. Both of these where seen as a move to replicate TikTok's success after its rapid rise in popularity

223).

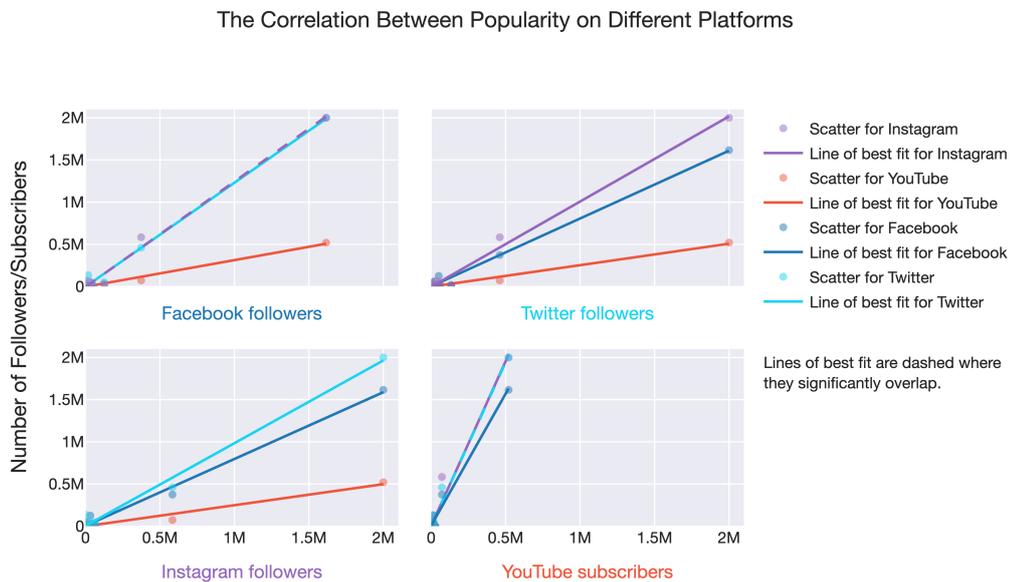


Figure 4.1: Linear regression showing the relationship between museums' popularity across different platforms.

Figure 4.1 highlights that larger followings on different social media platforms are highly correlated. This visualisation is a simplification of the data, as linear regression has been used which is a parametric method. As the distribution is non-normal, this is a poor representation of the true relationship between these variables (see Section 3.3.2), however, it has been used here – as is common practice when discussing social media metrics (Chatzopoulou et al. 2010) – to prioritise utility to museum practitioners and convey a correlation. The popularity of a museum on one platform strongly correlates with the popularity on other platforms. In short, the same museums tend to have large followings on multiple platforms, and it may be that they have the resources, expertise, and content to reach a wider audience.

The necessary conditions for success – resources such as time, camera equipment, and digital expertise – are universal to all platforms, even though the details and communication styles and certain requirements may differ. It may also be that success on one platform bolsters viewership on another. Most UK adults have social media accounts on different platforms, so it is possible that this represents the same people following a museum in different places (Ofcom 2021).

in the US and Europe (Kaye et al. 2022).

4.1.5 Museum Size

In this discussion, like throughout the thesis, I will be adopting the size categories developed by the Mapping Museums team, who classified museums into four groups based on the number of annual visits: ‘small (0–10,000 visits); medium (10,001–50,000 visits); large (50,001 to one million visits); and huge (over one million visits)’ (Candlin et al., 2019, 57). Figure 4.2 shows the distribution in the sample of museum sizes, of which there is only one ‘huge’ museum, the British Museum.⁹² As is clear from the totals of Figure 4.2, there are three museums for which the size data was unavailable, and they have been excluded from Figures 4.3 and 4.4.

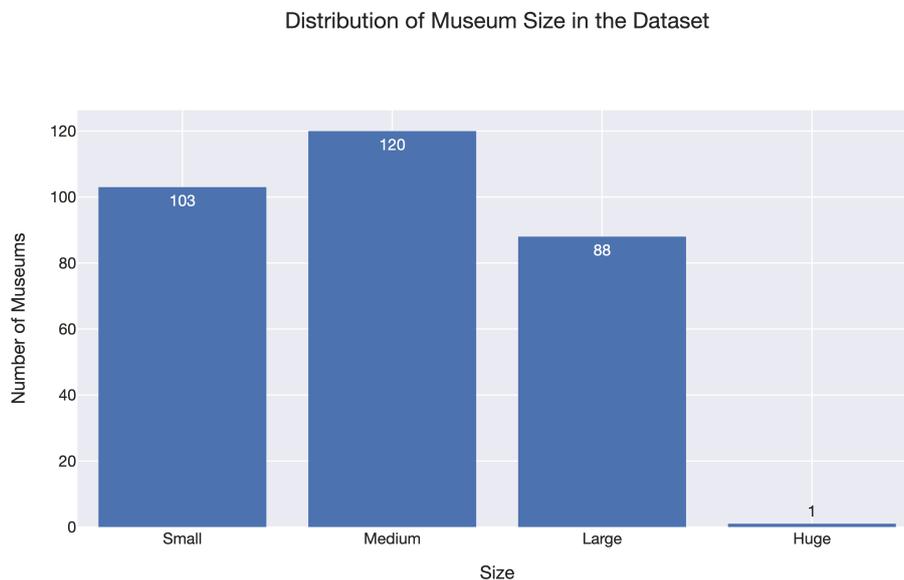


Figure 4.2: Distribution of museum sizes in the sample dataset, using the definitions based on annual visits used by the Mapping Museums Project (Candlin et al., 2019, 57).

By visualising the median follower count for each group (Figure 4.3), it becomes clear that across all social media platforms, larger museums tend to have larger followings. As size here is defined by visitor numbers, this could be considered obvious, as more visitors means a greater number of people may look them up online as a direct result of their visit. Size here could also be considered a proxy for the amount of resources a museum has. In general, museums with higher visitor numbers – which are disproportionately based in cities – received more government funding and generate more income through ticket sales and shop

⁹²The British Museum has largest follower base on every platform except TikTok.

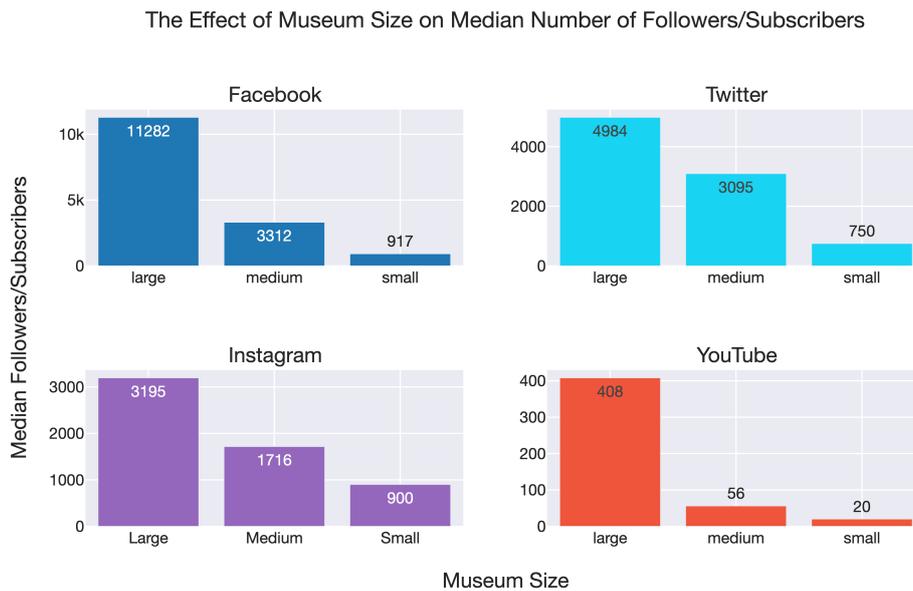


Figure 4.3: Median social media followings of different museum sizes, separated by social media platform (excluding the single huge museum).

purchases (Museums Association et al. 2020; Healey et al. 2021; Rhodes et al. 2024).⁹³ While the correlation between visitor numbers and budget is complicated somewhat by additional streams of income from memberships and legacies (Wait 2022), larger museums regularly have larger budgets, and therefore have the resources to invest in growing online audiences.

However, despite the clarity and intuitive logic of this trend, there is some variance in the attributes of museums that have large online followings.

4.1.6 Collection Subject Matter

In addition to size, the Mapping Museums dataset also included the metadata field ‘Subject’ which describes the type of collection an organisation has. Figure 4.4 shows the average number of followers when museums are group by the subject matter of their collections.

⁹³There is a historic correlation between metropolitan centres, museum size, and government expenditure in the arts. This has in part emerged due to high population densities in cities which has resulted in a high overall expenditure but low cost per head (Brader 2022). London for example, despite being museum-dense area, has the lowest number of museums per 100,000 inhabitants in the country (Ballatore and Candlin, 2023, 218; Candlin and Larkin 2020). However, a new ‘levelling up’ initiative aims to address this discrepancy and may see greater investment in museums with lower visitor numbers (Arts Council England 2022).

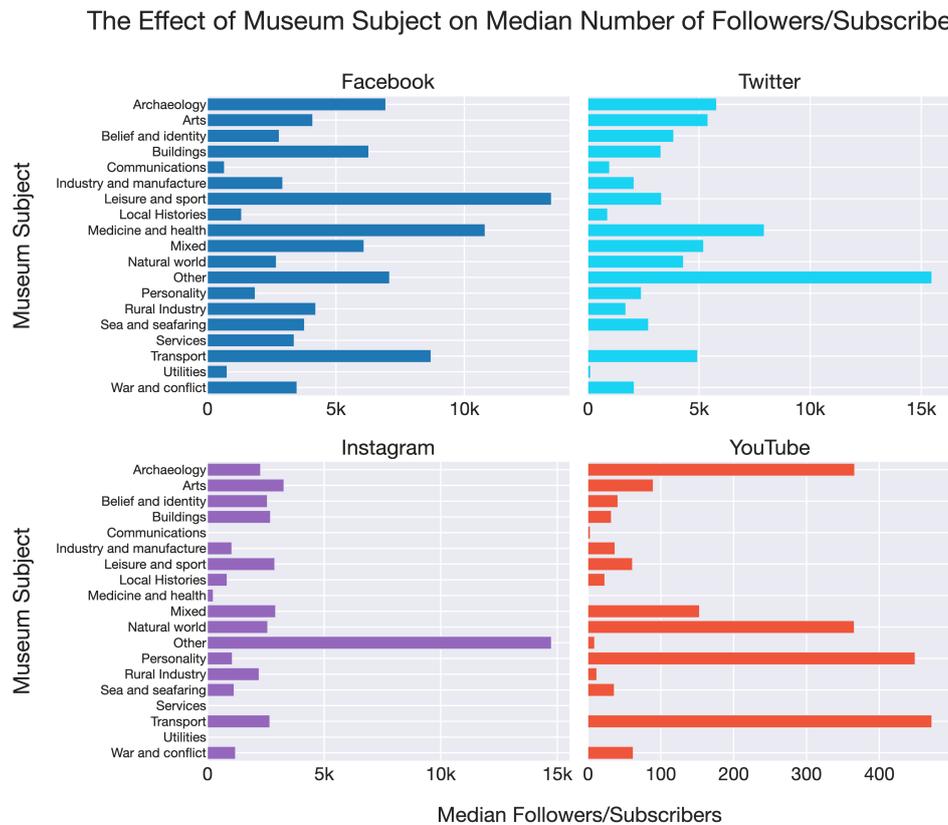


Figure 4.4: Median following of museums grouped by the subject of their collection, shown across four platforms.

It highlights differences between the platforms. On Twitter, ‘Archaeology’ is the best performing category, while on Instagram art collections dominate. This is perhaps unsurprising when considering the picture-orientated design of Instagram. However, the subcategories that the Mapping Museums team have implemented also reveal that ‘Music’ – here categorised under ‘Arts’ – does well, while surprisingly the subcategory ‘Photography’ does not. This may be due to levels of competition with museum accounts, as many contemporary artists and photographers have their own social media profiles, and in order to avoid issues with copyright museums often avoid posting more recent artworks (Fouseki and Vacharopoulou 2013; Barrett 2021). This figure indicates that despite the increasing popularity of short-form video content across social media, there still remains meaningful distinctions between platforms.

However, as the ‘subjects’ in this study only reflect a rough categorisation of museums by their collections, and not the content of an individual post, it only presents a broad trend. This will be analysed in significantly more depth in the

analysis of posts on Facebook and Twitter in the Population Study (p. 162). Unfortunately, sub-diving the smaller 315 museum sample into so many different categories results in poor reliability – an issue that the larger study addresses.

4.1.7 Pilot Study Summary

Ultimately, this study has highlighted that one in ten accredited UK museums have no independent online presence, with neither a dedicated website nor social media account on any platform. Local authorities facilitate online participation for many museums with the lowest levels of digital participation – a disproportionate number of which are Scottish, Welsh, and Northern Irish.

The same museums tend to have large followings across multiple platforms, but it is unclear if this is because popularity on one platform makes it easier to establish a larger following on another, or if it is merely that the same museums have the resources, expertise, and content to reach a wider audience. Ultimately, the majority of museum accounts have very few followers, and museum size is the best indicator of how large a social media following an organisation will have.

Key findings of the Pilot Study are summarised below:

- UK museums are heavily reliant on umbrella organisations – especially local councils – for digital infrastructure and support.
- In this data – gathered in 2022 – the vast majority of museums had not created a TikTok account.
- Social media adoption varies across the UK, and English museums are significantly more likely to have their own social media account than their Northern Irish counterparts.
- There is a power law distribution of followers amongst museums – a small number of accounts receive a lot of attention online, while the majority have very few followers.
- Large museums had by far the largest following across each of the five social media platforms, and there is a strong correlation between success across each of these sites.
- Transport museums – although disproportionately more likely to be small organisations – had the highest average followers on YouTube.

However, there were a number of limitations with this study. Most prominently, its focus on accredited museums. While this was to enable a greater focus on museums that received state funding, differences between the various funding bodies across the UK have complicated this analysis. I therefore decided that there were significantly more benefits to including the broadest possible range of museums in future studies. In addition, as post-level information was not gathered in this study, I was also not able to exclude accounts that were not in use – as this requires analysis when posts were uploaded in order to identify periods of inactivity.

Each of these limitations has been addressed in later studies but indicates the Pilot Study's utility in flagging problems with the planned methodology, data collection pipeline, and analysis. In addition, it provided a starting point for future analysis, highlighting the importance of museum size, subject matter, and the scale of digital inequality in the sector.

4.2 YouTube Study

The YouTube Study builds on the Pilot dataset, using the same 315 museums, but focusing on one platform. Due to the number of curators talks, blogs, and recordings of online events uploaded to YouTube, it was chosen for further study as a likely site of change. It is also of particular interest, as despite only 45.7% of museums having an account, it is one of the most broadly used social media platforms in the UK amongst all age groups, as Ofcom describe, 'YouTube continues to be used by virtually all UK internet users' (2021, 5). I hypothesised that this was likely a result of videos being difficult for museums to produce, especially in comparison to photos or a text post. As social media platforms are increasingly prioritising video, how museums create videos – and how they are received – is of increasing relevance to the sector.

There were several further advantages to narrowing the study in this way. By focusing on a single platform, it was possible to gather far more data from the platform API and expand the scope of the data collection – including over a significantly longer time frame. Metrics were collected for both the museums channels as well as each individual video on these channels from 2012 and 2022, enabling a fine-grained analysis of trends in museums' content. While the focus remains on the pandemic period, this additional data is used to contextualise the findings and produce a pre-pandemic benchmark against which the 2020 videos can be compared.

As such, this study aims to provide the following:

- Establish a pre-pandemic benchmark for the platform.
- Look at how the pandemic impacted both the production and reception of videos.
- Explore how trends and engagement differ between channels (using metrics such as the number of followers) and individual post – in this case each video.
- Prepare the data for a case study exploring the attributes of a popular post vs. an average post.

4.2.1 The Sector Average

The popularity of the channels varied dramatically and replicated the power law distribution seen in the follower numbers across each of the five social media platforms. The vast majority of both channels and videos have a small number of views with a few exceptionally well performing outliers. The result is that the mean number of subscribers to a museum’s channel is 4,890, while the median is a mere 46 (Table 4.5). This discrepancy is also evident between the overall channel views, and as previously explained in the description of the power law distribution (pp. 75, 82), as explained in the methodology, the median here is the more appropriate way to calculate average.

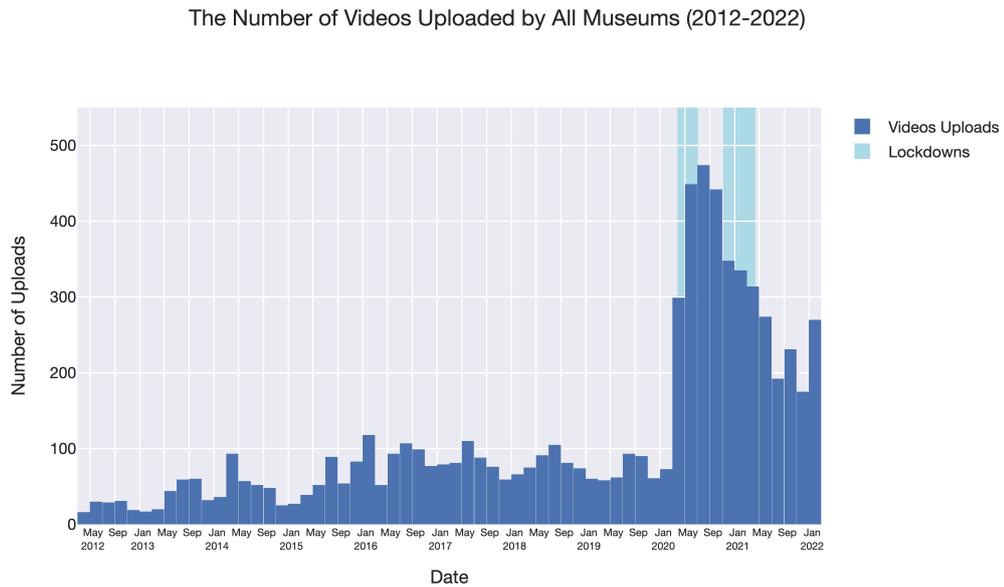
	Minimum	Q1	Median	Q3	Maximum	Mean
Channel views	10	1,175.8	6,136.5	62,761.5	55,600,610	644,972.8
Channel subscribers	0	10.8	46.0	409.3	521,000	4,890.5

Table 4.5: Distribution of number of channel subscribers and overall channel views for museums’ YouTube channels.

		Minimum	Q1	Median	Q3	Maximum
Channel subscribers	Small	0	4	18	47	650
	Medium	1	12.75	61	304.5	3,230
	Large	0	22	324	1,540	72,500

Table 4.6: Distribution of channel subscribers separated by museum size (excluding the single ‘huge’ museum).

4.2.2. Posting Frequency



is heavily affected by one video uploaded by the Royal Academy of Arts that received 6.6 million views. There is a smaller second spike in May that is due to a video published by the British Museum that had 7.3 million views, but its impact is partially offset by the increase in uploads. Due to the lack of data on when these videos reached their peak popularity, it is likely that their success was partially bolstered by the introduction of the lockdowns. As will be explored in the case study, videos that already popular are more likely to be recommended. Therefore, with more audiences online during the pandemic, it may be that they were predominantly recommended videos uploaded just before lockdowns came into effect.

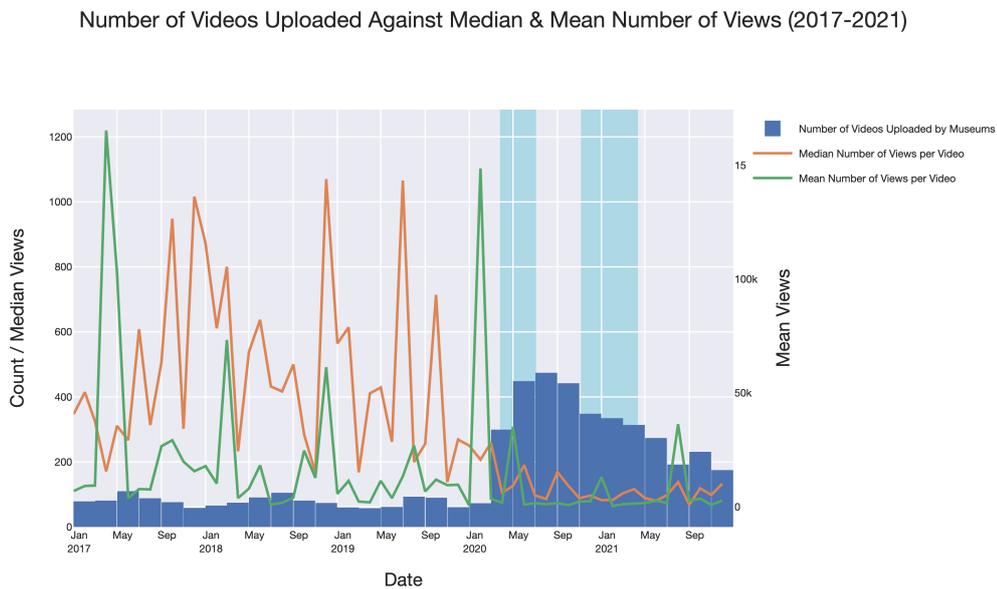


Figure 4.6: Number of monthly uploads across all museum channels shown against the median (left axis) and mean (right axis), and number of views for those videos.

The increasing number of uploads in March of 2020, stabilises the median, but it is clear that there was no increase in the average number of views during the pandemic. As the number of uploads had risen, it might be assumed that the increased quantity of video content had caused the average number of views per video to drop, while the total number of views had risen. Figure 4.7 shows that the views did in fact rise for museums over this period. This can be seen in the large peak in the total number of views in the first lockdown period. However, considered in the wider context of the last five years (Figure 4.8), it becomes evident that this growth was within the bounds of usual fluctuations and is not necessarily caused by the pandemic. The rise in views during the pandemic,

4.2.3. Viewership over the Pandemic

sees a return to levels seen in 2017 and was preceded by a significant drop in the number of views between 2018 and 2020.

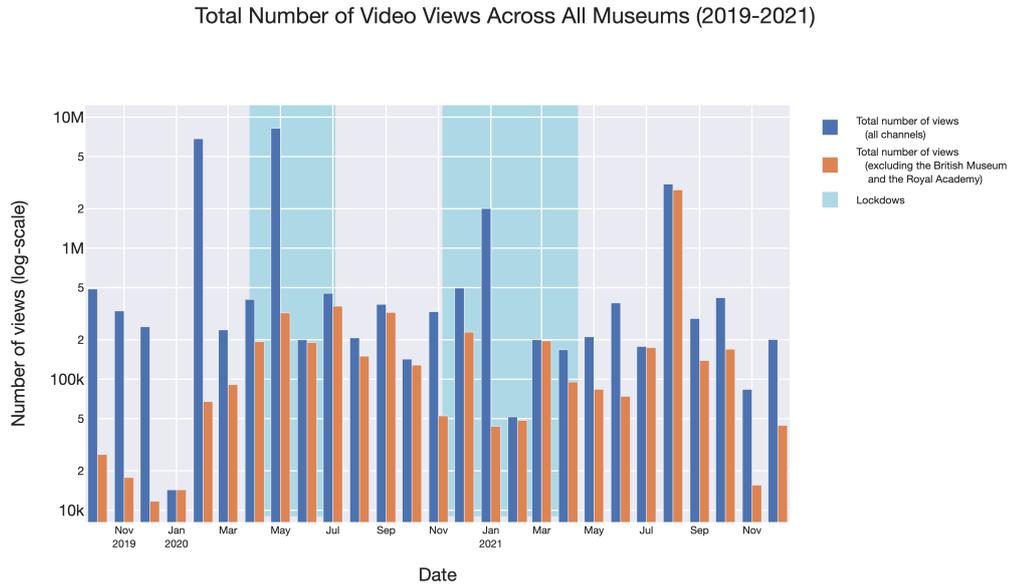


Figure 4.7: Number of views each month across all museum channels between 2020 and 2022.

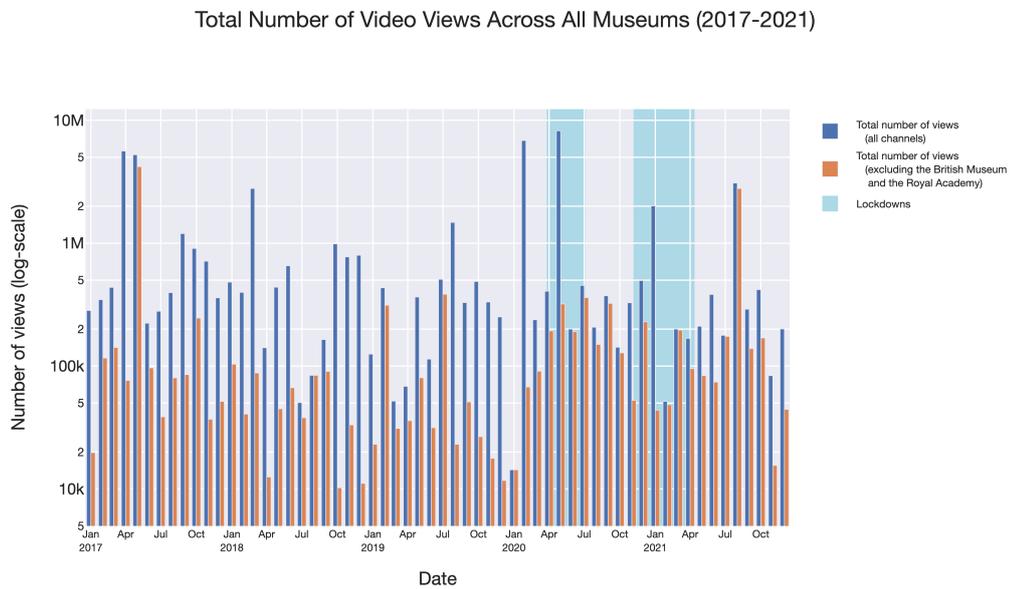


Figure 4.8: Number of views each month across all museum channels between 2017 and 2022.

The number of views should also be contextualised by the increase in viewer-

ship on the platform. In 2020 there was a 20.6% increase in the amount of time spent by UK adult users spent on YouTube (Ofcom, 2021, 85), and the platform increased its reach to 42.8 million UK users, an increase of 4% (Ofcom, 2021, 87).⁹⁴ Museum accounts then, do not appear to have capitalised on this increase, or translated it into large audiences.

Of the 315 museums, only the Royal Academy and British Museum saw a significant rise in the average number of views they were receiving – mirroring the extreme long-tailed distributions seen in both the Pilot and Population studies. This supports the initial findings of a NEMO survey published during the first months of the pandemic suggested that ‘4 out of 5’ museums had increased their digital services, but only ‘2 out of 5’ had seen an increase in online visits (NEMO, 2020b, 2-3). As the sample used for this YouTube Study is representative, it is unsurprising that the inequality is more extreme than in the NEMO report. The NEMO findings were based on survey responses from the organisation’s membership, with just under 1,000 voluntary participants – predominantly from Europe – returning a response (NEMO 2020b). As previously highlighted, it is often the most engaged, proactive, and well-resourced museums that have the time to respond. It is therefore likely the extent of the digital inequality in the museum sector has so far been under-reported.⁹⁵

4.2.4 Museum Size

Both subscriber numbers and upload schedules vary significantly between different sized institutions. Figure 4.9 explores the total number of uploads for different sized museums and indicates a significant increase in the number of videos uploaded by medium-sized museums in March. These institutions appear to have been the most responsive to the closure of museum sites in mid-March of 2020 (Adams 2022). Large museums also substantially increased their uploads in April, and both groups maintained this increased output over the first lockdown period.

⁹⁴Interestingly, this increase is dwarfed by the increasing use of streaming services such as Netflix, which is the primary contributor to the fact that there was a 44.6% increase in the amount of time UK viewers spent watching video-on-demand – which includes both Netflix, YouTube, and TikTok (Ofcom, 2021, 11).

⁹⁵It may also be true that the inequality between museums website visitor numbers may be less marked than that on social media. The recommendation algorithm – which will be discussed at length in the YouTube Case Study – likely exacerbates any inequality in audiences between museums. However, on websites there remains a number of algorithmic interventions – such as ranking of search engine results – that impact visitor numbers. A study exploring this would require data that would only be available by contacting each museum individually, with would be further complicated by the fact that many small organisations do not collect the number of page visits their websites receive or use tools such as Google Analytics.

4.2.4. Museum Size

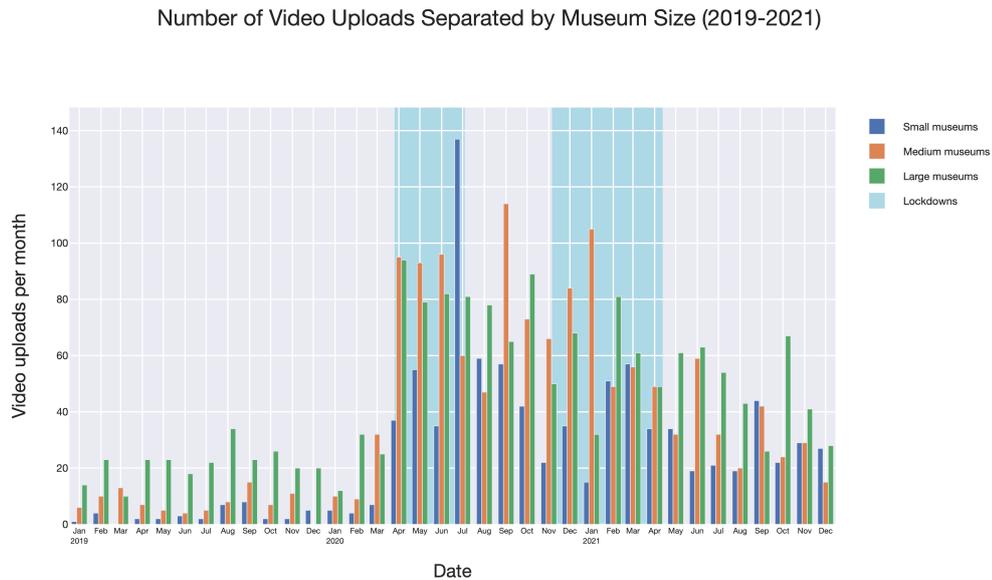


Figure 4.9: Number of monthly video uploads separated by museum size.

The speed with which medium and large museums responded increased the amount they were uploading to the platform reaffirms the findings of a UNESCO report which identified that the start of the pandemic ‘a large number of institutions have also put digital productions, applications and games from previous exhibitions back online to give them a new lease on life’ (2020, 15-16). The use of previously digitised resources enabled museums with existing digital assets and infrastructure to adapt quickly, exacerbating the already prevalent digital inequality (Mairesse and UNESCO 2019).

Smaller museums were slower to respond – likely due to the difficulties in accessing equipment and finding volunteers under the restrictions (p. 206). However, a close examination of individual channel uploads revealed that the July peak for small museums is largely accounted for by Barnsley Museums. The spike in uploads coincides with them publishing a collection of writing tips which consisted of multiple short videos a day for the entire month. With their contribution removed (Figure 4.10) it is clear small museums’ uploads rose, but to a lesser extent than larger organisations, despite the fact that small museums were the most prevalent group in the sample. Similarly, the uptick in uploads from medium sized museums in 2022 evident in Figure 4.9 was caused by the Hastings Museum and Art Gallery posting 153 videos over a three-month period and was also excluded in Figure 4.10.

4.2.5. Video Subject Matter

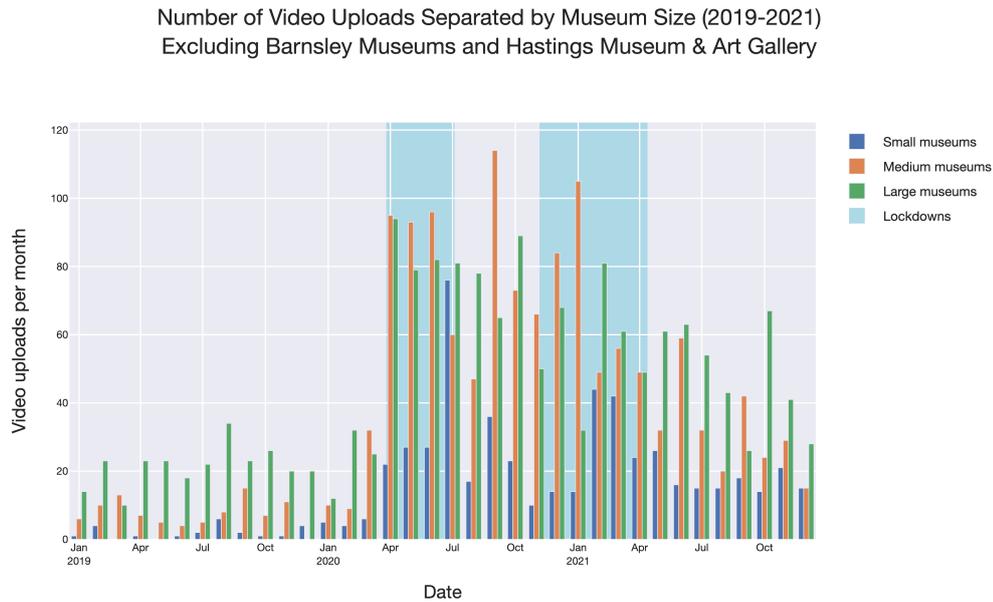


Figure 4.10: Number of monthly video uploads separated by museum size, excluding Barnsley Museums and Hastings Museum and Art Gallery.

4.2.5 Video Subject Matter

In addition to changes in the how often museums were uploading videos, the type of content produced also shifted over the course of the pandemic. Table 4.7 highlights that the proportion of ‘People & blogs’ content uploaded between March 2020 to March 2021 increased significantly in comparison to the previous year. It is also notable that while more ‘People & blogs’ videos were produced over the pandemic, they did not perform particularly well (Table 4.8).

Investigating the low average number of views, it emerged that 92.8% of these videos were uploaded by medium or small museums, making it difficult to identify why they performed poorly. It may be due to the small audience size of the channels uploading them, or due to a lack of resources to produce other types of content in lockdown conditions. Speaking directly to a camera requires far fewer resources than online events, or the 3D gallery tours or drone ‘fly through’ exhibition shots that were frequently found in larger organisations (Euston 2020; King et al. 2021). As Nigel Taylor-Jones at the Museum of Gloucester shared, ‘My Samsung A40 smartphone has a brilliant camera. Once I learnt how to email large files using a Google Drive and I overcame my initial anxiety... everything seemed to fall into a logical rhythm.’ (Taylor-Jones 2020). However, there is a second reason that ‘People and blogs’ may be more popular with smaller museums. It

Type of Video	Percent of uploaded videos		
	Year (beginning 01/03)		
	2019	2020	2021
Education	32.0	23.5	27.0
Nonprofits and Activism	20.4	18.1	12.1
People and Blogs	18.8	30.3	20.6
Film and Animation	12.6	9.2	11.1
Entertainment	6.2	5.6	12.0
Travel and Events	6.0	1.8	4.4
Science and Technology	2.3	6.4	4.9
Autos and Vehicles	1.4	1.4	1.3
Pets and Animals	0.2	NA	0.3
Howto and Style	0.2	1.2	1.2
Music	NA	2.5	4.1
Sports	NA	NA	0.2
News and Politics	NA	NA	0.8
TOTAL	100	100	100

Table 4.7: Proportion of different category of uploaded videos compared between 2019 (437 uploaded videos), 2020 (2347 uploaded videos), and 2021 (1456 uploaded videos).

is the default setting that YouTube assigns to a video (Mills 2024).⁹⁶ Therefore, new or inexperienced YouTube users are less likely to be aware of this feature and leave it as the default. This would indicate that many of the small museums had not previously been proficient YouTube users before the pandemic but were now experimenting with the platform.

However, overall ‘Education’ videos were the most frequently uploaded over the three-year period, but received relatively low numbers of interactions on average (Table 4.8). During the pandemic, museums began uploading educational resources to meet the demand for educational resources as schools closed. These included live streams, and ‘story times’ to help teachers and children’s caregivers educate from home (Samaroudi et al. 2020). Ofcom reported that the demand for educational content rose during this period, and YouTube launched the Learn@Home initiative, which saw curated content from established educational

⁹⁶While this is not mentioned in the YouTube documentation, I was able to confirm this as the default setting by uploading a video to a brand new channel. Unfortunately, I am unable to confirm whether this was also the case in 2020. It should also be noted that while a number of settings implement new speech and facial recognition technologies (for both auto-captioning and automatic thumbnail generation), however, the categories feature was not labelled as AI. To be sure, I tested multiple videos containing different imagery and each was categorised as ‘People and blogs’ as default.

channels brought to one place (Ducard 2020; Ofcom, 2021, 70).

A NEMO survey from April 2020, museums consistently reported that ‘both educational and collections related materials, including video and film content, were most popular with online audiences (NEMO, 2020b, 3). Yet average levels of engagement were low for this category, and it was ‘Entertainment’ that had the highest number of average views per video in 2019 and 2020, and the second highest in 2021. Despite strong viewing figures it was less frequently uploaded by museums than ‘Education’ videos, and was only the 6th most uploaded video category respectively.

It may be the average viewing figures for ‘Education’ videos were lowered by many museum accounts with smaller followings uploading these videos during the pandemic. This may indicate that museums chose to pursue their educational agenda during this period, despite low levels of participation.

Type of Video	Median number of views		
	Year (beginning 01/03)		
	2019	2020	2021
Autos and Vehicles	98.0	87.0	73.0
Education	1130.0	174.0	88.0
Entertainment	2771.0	890.0	202.0
Film and Animation	138.0	35.0	32.5
Gaming	NA	160.0	NA
Howto and Style	111.0	148.0	41.0
Music	NA	526.0	282.0
News and Politics	NA	102.0	91.5
Nonprofits and Activism	263.0	117.0	139.5
People and Blogs	132.0	69.0	27.5
Pets and Animals	121.0	NA	61.0
Science and Technology	416.0	127.0	65.0
Sports	NA	NA	5.0
Travel and Events	219.5	247.5	181.0

Table 4.8: Median number of views per video separated by video category compared between 2019, 2020, and 2021.

4.2.6 YouTube Study Summary

By focusing on a single platform, it became possible to gather far greater depth of data from the YouTube API. This study establishes a pre-pandemic benchmark, adding a decade of additional data to contextualise the pandemic trends. This

highlighted that levels of activity had been stable but stagnant on the platform for many years, and there was a significant drop in the overall viewership of museums' videos between 2018 and 2020. There was, however, a massive increase in activity in May of 2020, although this did not correlate with a rise in the number of views for the majority of museums. With half of the channels having less than 46 subscribers, this study made clear that posting on social media does not guarantee an audience.

This study identified a number of trends:

- The pandemic and consequent lockdowns resulted in a large increase in the number of videos uploaded to YouTube.
- Large and medium sized museums were able to respond faster to the perceived demand for content, uploading more videos in a shorter time frame than small museums.
- The content uploaded to YouTube changed over the course of the pandemic, with museums producing more 'People & blogs' video content – although this category did not perform well.
- 'Education' was the most frequently uploaded category by museums, and had the highest number of average views, yet 'Entertainment' – which also had a high number of views on – was far less popular for museums to upload.
- Only the two largest museums in the sample saw an increase in the number of views during the first lockdown. For other museums, their increased uploads to YouTube did not result in an increase in the number of views their channels received.
- Museum channels saw a drop in the number of views between 2018 and 2020 but rose to 2017 levels again in 2021.

4.3 YouTube Case Study

Building on the last results, this case study will explore how two videos uploaded by a huge national institution, the British Museum, were received by audiences during the pandemic. In the study of 315 UK museums, the British Museum was the largest organisation – based on the annual visitor numbers – in the sample. It had by far the largest social media following and at the time of writing has 1.76 million followers on Facebook, 2 million on Twitter, and 2.1 million followers on Instagram (Charlesworth, Warwick, Impett and Beresford, 2023, 10).

The case study aims to situate these posts within broader context of both organisational strategy and decision making, as well as the platform itself. As such, it hopes to explain and elaborate on the first two studies, and to achieve the following:

- Identify the defining features of a high performing post (if any) compared to an average post.
- Identify factors that impact engagement metrics – both to do with the content and quality of a video, as well as its format and metadata.

4.3.1 Re-utilising Old Resources

With an established online presence before the outbreak of Covid-19, the museum was able to adapt particularly quickly to the closure of its physical site on March 18, 2020 (British Museum 2020a). The first national lockdown in the UK – beginning on the 23rd of March with most restriction ending on the 4th of July – prolonged what was originally envisaged as a short temporary closure, and the museum would not reopen until August the 27th (British Museum 2020b). On announcing its closure, the museum had already outlined its digital strategy going forward. The Director of the British Museum, Hartwig Fischer, stated, ‘We’ll be updating and adding to digital content during the period we’re closed to allow visitors to stay in touch with the Museum. We’ll share our collections, research and programmes in new ways that will not require a trip to the Museum’ (Brown et al. 2021; British Museum 2020a). Alongside his statement, the website was updated so that the homepage displayed a large banner detailing a list of digital activities. The page prompted visitors to ‘stay connected’ in multiple ways: it invited them to take a virtual tour on the website; look at the collections online; use the resources for schools; listen to the British Museum’s podcast; get in touch through social media; or explore the museums’ content on Google Street View and Google Arts and Culture.

Over the course of the first lockdown period, the website was regularly updated with new content – predominantly published within the framework of existing digital initiatives at the museum. Unfortunately, metrics such as the number of views, dwell time, and audience analytics of the website and Google Arts and Culture content are not publicly available. However, the reception of online content over time can be monitored in part on social media platforms, for which data is available through an application programming interface (API). In addition, basic metrics and the relative success of a piece of content is easily viewable on

the platforms themselves. One the most successful pieces of content the British Museum produced, was an old video tour of an exhibition uploaded to YouTube in May 2020. This video has been chosen as the focus of this case study, as it received large amounts of engagement on social media and remains the single most watched piece of content on the museum’s YouTube channel in 2023.

‘Vikings Live: a tour from the British Museum’ is an hour and a half long video that was originally created in 2014 and re-uploaded on May 27, 2020 (British Museum 2020c). Advances in technology since the video was filmed, mean that the production values – particularly the resolution and sound quality – are notably lower than more recent uploads on the museum’s YouTube channel. The presenters, Bettany Hughes and Michael Wood, take turns in interviewing key staff members and visiting experts (Figure 4.11) who explain the process of setting up the exhibition as well as the history of the physical objects. These segments are interspersed with footage of historical re-enactments (Figure 4.12), questions from the public, and graphical overlays that show migration patterns and the location of archaeological sites (Figure 4.13).



Figure 4.11: Screenshot from Vikings Live (timestamp 8:28), showing Bettany Hughes talking to archeologist Neal Price in front of an exhibition display – the dominant format of the video.

Originally created for broadcast in cinemas, the video itself was not created for YouTube and therefore is atypical of the platform which is dominated by individual content creators, not institutions (Xiang 2022). With a run time of 89 minutes, the duration of ‘Vikings Live’ is much longer than the average YouTube video which



Figure 4.12: Screenshot from Vikings Live (timestamp 1:26:28), showing a reenactment of a Viking burial conducted live during recording at the British Museum site.



Figure 4.13: Screenshot from Vikings Live (timestamp 28:46), showing an animated of Viking trade routes.

is less than 15 minutes long (Rieder et al. 2020; Che et al. 2015). Yet despite content designed for other platforms often underperforming compared to ‘native’

YouTube content, by March 2023 ‘Vikings Live’ had been viewed over 8 million times (Rieder et al. 2018; Arthurs et al. 2018). Does that make the ‘Vikings Live’ video a success? By contextualising this figure, this study aims to highlight what influences the number of views a video might receive and investigate whether the metric has any use as an evaluative tool for researchers and museum practitioners.

4.3.2 Viewership

As Figure 4.14 shows, ‘Vikings Live’ was uploaded in the middle of the UK’s first national lockdown. In uploading a virtual tour near the beginning of the pandemic, the British Museum likely benefited from the influx of online visitors looking for cultural content. As highlighted in the YouTube Study, larger organisations were better able to quickly adapt to lockdown conditions than their smaller counterparts and increase the number of videos they were uploading to YouTube faster. The British Museum was similarly able to quickly respond to demand for at-home content, utilising their pre-existing YouTube channel which already had an established follower base. Comparatively, organisations without existing audiences or staff expertise struggled to establish themselves in highly competitive online environment (NEMO 2020b; Arthurs et al. 2018).

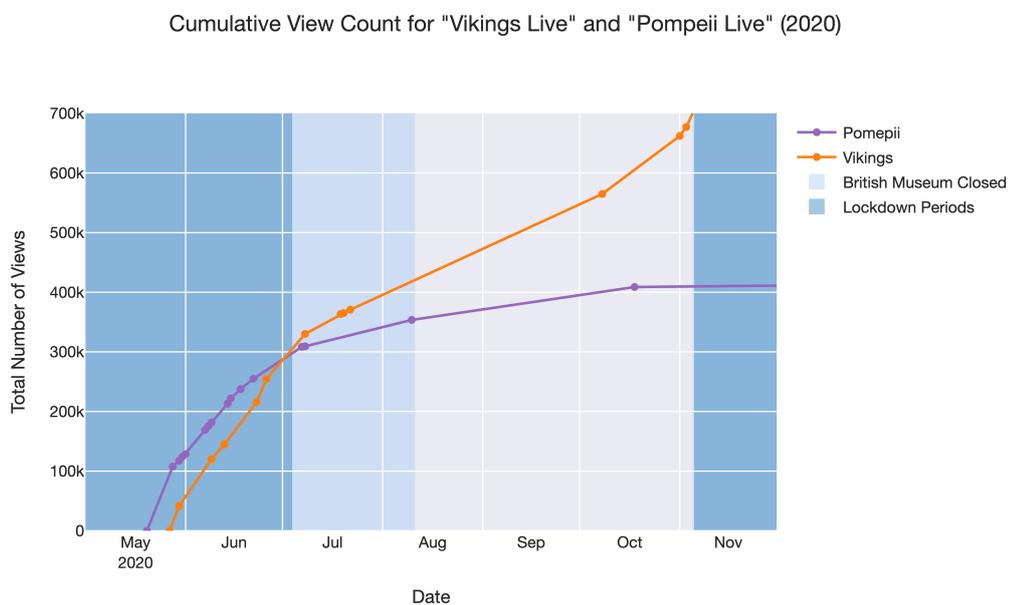


Figure 4.14: Cumulative number of views of ‘Vikings Live’ and ‘Pompeii Live’ over the course of 2020.

And yet, notably, despite the exceptional circumstances in which the video was

uploaded to YouTube, its initial reception was in line with other videos on the British Museum's channel. In the first three months after it was uploaded, the number of views remained below 500,000. This is not unusual, which is best illustrated when compared to the view count of 'Pompeii Live from the British Museum'. 'Pompeii Live', uploaded a week before 'Vikings Live' on the 20th of May 2020, provides a useful benchmark for comparison. Filmed in 2013, it is remarkably similar to 'Vikings Live', sharing both a format and presenters (Figure 4.15 and 4.16). Yet in 2023, it still has less than 500,000 views and is only the 24th most popular video on the museum's channel. Does this mean that 'Vikings Live' is more engaging or a better video? By breaking down the number of views changed over time, it is possible to see why this kind of evaluation can be misleading.



Figure 4.15: Screenshot from Pompeii Live (timestamp 26:47), showing Bettany Hughes talking to classicist Mary Beard in front of an exhibition display – again the dominant format of the video.

When initially uploaded to YouTube, the two videos both performed similarly (Figure 4.17). On first being released, the number of views for both videos increased rapidly before slowing down over the summer of 2020. Taken in isolation this early spike in audience views could be assumed to be shaped by the larger pandemic audiences however, during the second lockdown period, 'Pompeii Live' did not see any increase in the number of views, meaning that the mere presence of house-bound audiences during the lockdowns did not automatically result in larger audiences for museums.

In contrast, the second lockdown saw an enormous increase in views for 'Vikings Live'. The incomplete nature of the Wayback Machine's archive means that there is little data from this changed over November and December of 2020. However, the stark contrast between the Pompeii and Vikings exhibition is clear.



Figure 4.16: Screenshot from Pompeii Live (timestamp 66:56), showing an animation of the eruption of Mount Vesuvius.

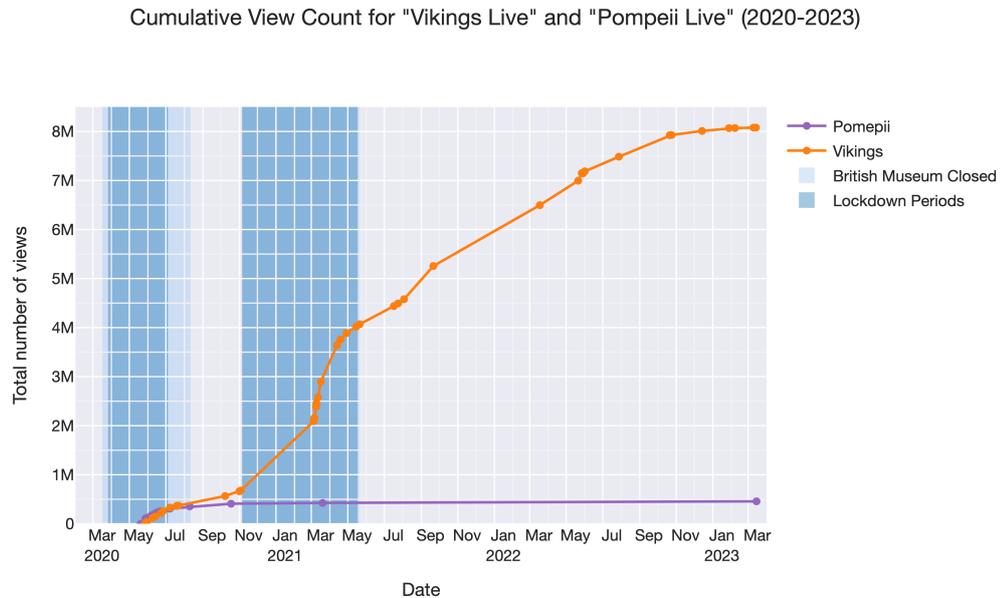


Figure 4.17: Cumulative number of views of 'Vikings Live' and 'Pompeii Live' over the course of three years, from 2020 to 2023.

It may be possible to attribute some of the popularity of 'Vikings Live' to the subject matter. During the pandemic, Vikings were on the UK syllabus and a topic that was taught in primary schools (Department for Education 2013). Yet in a large study of what drives the number of views on videos, Zhou et al. found that the recommendation system had far more long-term impact than promoting a video or embedding it on other social media sites (2016, 6052). Therefore, it is unlikely that people looking for Viking education content or following links from the Brit-

ish Museum website directly caused the high number of views on ‘Vikings Live’. It is however possible that this was a contributing factor in the recommendation algorithm pushing ‘Vikings Live’ and not ‘Pompeii Live’.

4.3.3 The Role of the Recommendation Algorithm

However, the stark contrast between the Pompeii and Vikings exhibition is indicative of the way videos are popularised on YouTube. While the specifics of the recommendation and ranking algorithms of YouTube have not been made publicly available, there are two factors that most likely contribute to this effect. Firstly, at the start of the first pandemic, ‘Vikings Live’ proved the slightly more popular video, making it more likely to be recommended to YouTube users – an effect that is compounded over time. The more views a video has, the more likely it is to be recommended, the more it is recommended the more likely it is to be viewed. If the video is regularly recommended but users do not click on it, over time it is recommended less often; this is partially why outrageous titles and staged picture thumbnails are so prevalent on the platform (van Es 2020; Shimono et al. 2020). The ranking of videos, both through the search and recommendation systems, massively affect the click-through rate on a new video; the first video in a list is almost six-times more likely to be clicked on than the last (Zhou et al. 2010). It is probable that these differences over time had contributed to the dramatically different viewing figures for ‘Pompeii Live’ and ‘Vikings Live’.

As mentioned in the methodology, a log-normal distribution of views is typical of YouTube videos (Kamiyama and Murata, 2019, 1103). This should not be falsely attributed to audience viewing habits or the quality of engagement the video inspires, instead, it is the result of the way YouTube’s recommendation algorithm prioritises recently uploaded videos (Gregersen and Ørmen 2021; van Es 2020). The recommendation algorithm suggests videos for users to watch next, and combined with their ranking of search results, heavily influences how many people see a video (Arthurs et al. 2018). Although there is a wealth of literature on these effects regarding viral videos, beauty content, and vlogs, it rare for the videos of museums to be discussed in such a way. This highlights how limited ‘views’ are as a tool for evaluation on social media platforms; not only is the figure not a reflection of the content’s quality, it also does not reliably reflect the type of content that will do well in the future as two similar videos received dramatically different receptions.

As changes to YouTube’s algorithms is not made public, we can only speculate as to why certain topics and videos are chosen, and the details of how it functions

are not understood by users. There is a wealth of speculation about the algorithm published on the platform itself, and network of self-styled algorithmic experts who sell advice on how to game the system have emerged on the platform (Bishop 2020; 2018). However, even amongst experts and specialists, the workings of the algorithm are a mystery (Cunningham et al. 2016). As it is a ‘black box’ algorithm, not even those who created it necessarily understand why some videos outperform others, and at best we can partially recreate some of the decision-making process through large scale data analysis.

It is therefore not surprising that even the British Museum, a huge national institution with a dedicated digital team, has been unable to optimise their videos for YouTube’s algorithm. In their video posted on the 9th of March 2023, Nick Harris, a senior producer of the British Museum commented in a video: ‘And if you could give the new videos a like when they come out, we would really appreciate it as it massively helps with the algorithm, which – to be honest – hasn’t been that kind to us of late’ (British Museum 2023).

Despite this, the British Museum continues to quote social media metrics in their annual reports with little nuance or qualification (British Museum 2022). Yet the unpredictability of the algorithm, and its lack of correlation to the quality of the content or social engagement, severely limits the utility of social media metrics for evaluation. The types of content museums are more likely to make – irregularly uploaded, long-form content – is not optimised for sharing on YouTube (van Es 2020). By breaking down the view count of the ‘Vikings Live’ video and comparing it to the similar video ‘Pompeii Live’, we have shown how unpredictable metrics on social media platforms can be. Whether an individual video is popular or not, is heavily influenced by factors beyond an organisation’s control, and as such, they cannot be used to compare between organisations or exhibitions over time by themselves. This severely limits their usefulness in evaluating how the design and curatorial decisions have impacted the reception of the video.

Part of the difficulty this presents is that many museums may conflate adapting their content for their audience – which is considered good practice – with adapting their texts in such a way that the platform, not audience, share their content. For example, if audiences stop engaging with certain types of posts, staff may assume this is because their audience is no longer interested, and not realise that their content is not being shown to their audience because the platform is ‘pushing’ a different type of post. As such, this opaque recommendation system highlights the intermediary role that platforms are increasingly playing between museums and their audiences.

4.3.4 YouTube Case Study Summary

Through the use of two case studies, this section has explored how we can contextualise social media metrics and explores the ways in which they are a simplification of enormously complex outcomes (Espeland and Sauder 2016). It has highlighted that they are ineffective as evaluative tools, as the metrics are shaped by factors that have nothing to do with the quality of the content itself and success on a platform cannot be reliably replicated. In short:

- Recommendation algorithms are one of the primary driving factors behind high levels of online engagement.

4.4 Population Study

Each of the previous three studies have highlighted new facets of the museum sector's use of social media during the pandemic. During this process, the methodology was further refined and developed for this Population Study, which represents – to the extent that it is possible – every UK museum.⁹⁷ This includes unaccredited museums in a marked difference to the first three studies.

As previously discussed in the methodology, the data for this study was provided by the Mapping Museums team, who shared the data they had collected on museums' social media between 2019 and 2022. While a preliminary analysis of the data was underway when the data was shared – and consequently published (Larkin et al. 2023) – the following represents my own work and was conducted independently. The main avenues it aims to explore are as follows:

- Establish a benchmark for the sector, exploring average levels of engagement on different platforms.
- Explore how the pandemic impacted both the production and reception of social media posts.
- Identify top performing museums and the types of institutions and digital strategies that generate high levels of engagement.
- Identify top performing posts, their attributes – e.g. format and media – and what topics they cover.

⁹⁷The Population Study takes its name from the statistical meaning of the word – it covers the whole statistical population, not just a sample.

As the Population Study is significantly larger than those that preceded it – and adopts a broader range of tools for analysis – the following section is split up into three general sections. The first, ‘Museums on social media 2019-2022’ establishes a benchmark for the sector, before exploring the impact of the pandemic on both museums’ posting habits and engagement. The second, ‘High Performing Museums’ looks at the attributes of museums that perform well, while the final section, ‘Engaging Topics’ explores what type of topics perform particularly well, exploring the most popular hashtags and topics on both Twitter and Facebook. This section aims to open a more nuanced discussion of what success on social media can look like for museums, and the impact that platform recommendation algorithms have on the reception of museums’ posts.

4.4.1 Museums on Social Media 2019-2022

4.4.1.1 Improving Estimates of Social Media Adoption

As this Population Study includes a comprehensive list of unaccredited museums, it first and foremost addresses many of the limitations of the Pilot Study and the initial analysis conducted by the Mapping Museums team. Larkin et al. found Facebook accounts for 77% of museums, while 67% had accounts on Twitter. The percentage of museums using the platform drops further when inactive accounts – here defined as accounts that did not post at all over the three-year period – are excluded. 64% of museums had active Facebook presence, and 60% are active on Twitter (Larkin et al. 2023).

These figures are different to those reported below. While the preprocessing and cleaning is similar in both studies, as my research involved in-depth textual analysis, it flagged a number of additional non-museum accounts which were then removed. The majority were sports clubs and small business accounts, and the Mapping Museums dataset has consequently been updated. By removing these non-museum social media accounts, there is a relative drop in the proportion of museums that use social media between Table 4.9 and the Mapping Museums team’s publication.

Table 4.9 also represents a decrease in the proportion of museums with Facebook and Twitter compared to the Pilot Study. For accredited museums, this discrepancy is likely caused by the removal of inactive accounts, which was not done in the first study. The drop from 85% to 71% for accredited museums on Facebook – and 74% to 65% on Twitter – closely mirrors the drop between the raw dataset compared to the cleaned dataset in the Population Study. Of course, the overall

4.4.1.2. The Impact of Covid-19 on Activity Levels

	Total Number	% with active Facebook presence	% with active Twitter presence
Accredited museums	1658	71.68	65.63
Unaccredited museums	1644	55.53	49.18
All museums	3302	63.53	57.33

Table 4.9: Percentage of museums active on social media between 2019 and 2022.

levels of social media adoption in the larger study are also heavily impacted by the inclusion of unaccredited museums, which are significantly less likely to have an active social media presence. This confirms the earlier hypothesis that accredited museums – which are generally large and better resourced – are more likely to be active on social media.

4.4.1.2 The Impact of Covid-19 on Activity Levels

Having established the proportion of museums on social media, I explored how this changed over the pandemic. Figure 4.18 highlights that ultimately there was no major increase in the number of museums using each social media platform. Twitter has seen a decline in the number of museums using it over the three-year period. This declining use of Twitter correlates with Elon Musk’s acquisition of the platform (Zahn 2022). As highlighted in the methodology (p. 105), many museums abandoned the platform in response to changes to the moderation policy (Jikeli and Soemer 2023; Reilly and Duffy 2023; Hickey et al. 2025).⁹⁸

⁹⁸While not captured in this data, use of Twitter – now X – has dropped further amongst museums over the past two years in response to Musk’s overt support of right-wing extremist movements (Vaughan 2024; Buncombe 2025; Connolly 2025; Dawson 2025).

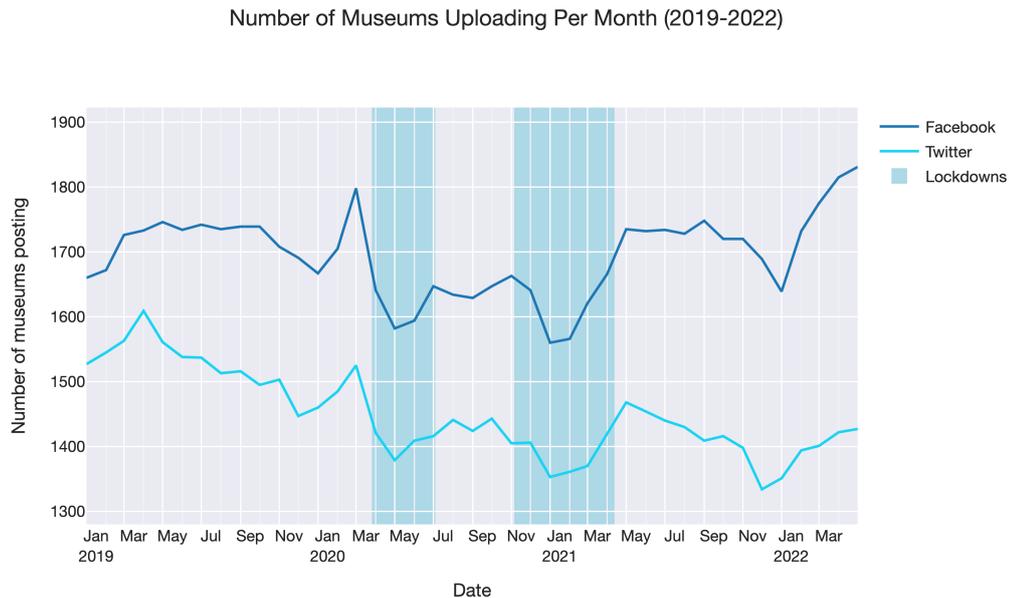


Figure 4.18: Number of museums uploading to Twitter and Facebook per month (January 2019 to April 2022).

Despite the fact that the spikes seen in March of 2020 are not outside of the variation seen in 2019, it is significant that there is an increase across both platforms in the first lockdown period. A close examination of the data reveals a number of small museums uploading to both Facebook and Twitter increased in March of 2020 – most likely posting notices of site closures. However, this drops significantly over the course of the year, calling into question the idea that the outbreak of Covid-19 resulted in a larger number of museums using social media in a sustained manner.

There was a more significant change in the frequency with which museums were posting (Figures 4.19 and 4.20). This is most notable on Twitter (Figure 4.19) during the initial lockdown period in April of 2020.

Figure 4.19 splits the uploads into original tweets, retweets, and replies. Each of these presents a different mode of communication on the platform: the first is analogous to a traditional post; while retweets enable users to repost something, showing it to their followers either with or without additional comment; finally, a reply begins by addressing another user e.g. @britishmuseum, and this is only shown to users (in their ‘timelines’) if they follow both the account that posted the original tweet and the account that replied (Kim and Yoo 2012).⁹⁹ It was a practice

⁹⁹Mentions are similar, but do not begin with the username. For example, a reply would be ‘@BritishMuseum thanks, I had a great day out.’, whereas a mention might read, ‘I just visited the @BritishMuseum, it was a great day out.’

4.4.1.2. The Impact of Covid-19 on Activity Levels

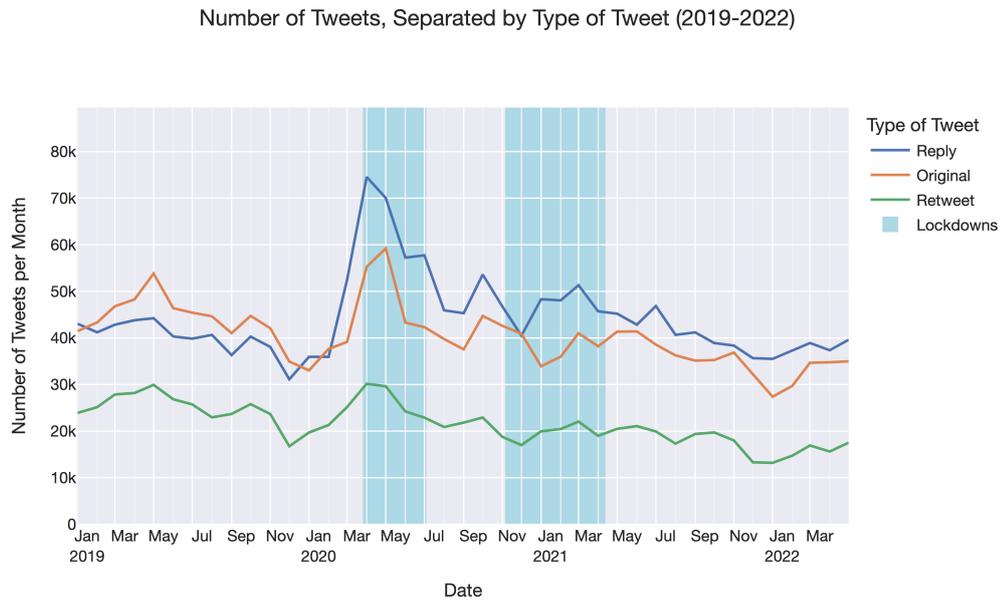


Figure 4.19: Number of tweets posted by museums per month, separated into retweets, replies, and original tweets (January 2019 to April 2022).

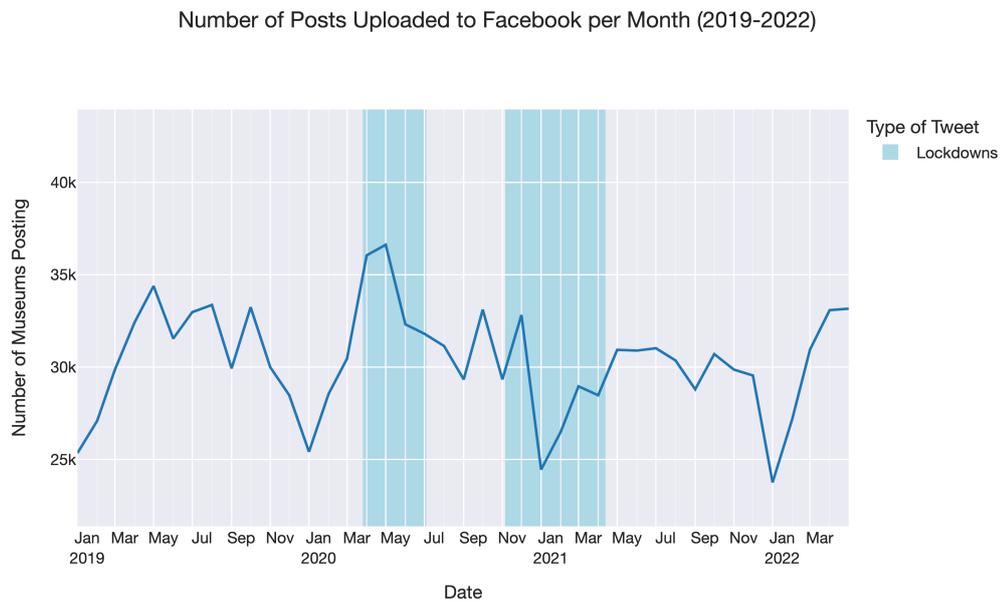


Figure 4.20: Number of posts uploaded to Facebook by museums per month (January 2019 to April 2022).

that emerged from the user base that was then implemented as a feature, and is described by the Twitter developers as having a ‘group conversation’ (Williams 2008).

The increase in activity in 2020 is predominantly accounted for by an increase in the number of replies. All museums that used Twitter during this period replied to a tweet at least once, with 75% of accounts having used replies 77 times or more. However, a small minority frequently use replies to address individual visitors' queries directly – usually about site closures. In March 2020, five museums replied more than a thousand times in a month, contributing to the dramatic increase seen in Figure 4.19. These outlying museums were the Museum of English Rural Life (the MERL), Yorkshire Museum, Bradford Museums, the Globe, and Enniskillen Castle.

There was a small increase in the number of original tweets museums were posting, but well within the usual levels, and equivalent to the amount of Twitter activity in May 2019. The number of retweets museums were posting is similarly increased, but it is once again within expected range, as museums generally tweet less in the winter months, especially January.

For Facebook – for which there is not a direct equivalent to replies – there was not as large an increase in activity. In Figure 4.20, it is clear that while the amount of posting did rise in March and April, it peaked at 41,540 posts in May of 2020, comparable to the 41,366 posts in May of 2019. Notably however, the amount of activity on Facebook in 2021 was lower than the previous two years, and this may well reflect a shift in focus on the on-site experience. In 2022 the number of museums posting returns to the pre-pandemic levels, while the overall number of posts exceeds the total for 2019.

These trends are somewhat obscured by the seasonal shift in museums' posting habits, which is most noticeable in the Facebook visualisations. The frequency of posting on Facebook dramatically drops in January of each year – likely due to seasonal closures and staff taking time off around the festive period – before rising again in the Spring. This mirrors the seasonal variation in activity found in the YouTube data across a five-year period (p. 125). This same pattern can be seen in the Twitter data more clearly when the different types of tweets are aggregated, but is also visible in the drop in the number of museums posting each December (Figure 4.18).

Ultimately, the relative increase in activity on Facebook and Twitter – with the exception of replies – was not outside of the normal fluctuations. This is in stark contrast to the findings of the YouTube Study, which showed a six-fold increase in the number of uploads to the platform during the first national lockdown (p. 125). This suggests that some museums used the pandemic to experiment with video content – expanding into new or underutilised platforms.

4.4.1.3 A Benchmark for Engagement

In order to explore how the pandemic impacted engagement, first a benchmark was established. In general, levels of engagement on both platforms are low and interactions – such as likes, comments, shares, and retweets – are disproportionately directed at the top performing accounts. On Twitter the top 10% of museum accounts accounted for 75% of interactions, while on Facebook this rises to 85% of all interactions. In fact, just the top 1% of accounts on Facebook received 60% of all interactions.

The distribution has been explored in more detail in Tables 4.10 and 4.11 and repeats the trend found in the Pilot and YouTube studies.¹⁰⁰ These tables highlight just how low levels of engagement are, with 70% of tweets and 30% of Facebook posts receiving five interactions or fewer.

Interaction type	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
Retweets	0	0	0	0	0	1	1	3	4	9
Replies	0	0	0	0	0	0	0	0	1	1
Likes	0	0	0	0	0	1	2	3	6	13
Quotes	0	0	0	0	0	0	0	0	0	0
Overall reactions	0	0	1	1	2	3	4	7	11	24

Table 4.10: Deciles of different types of interactions with museums' tweets.

On both Twitter and Facebook, 'likes' account for the majority of interactions, while 'retweets' and 'shares' are the second most popular interaction respectively. On Facebook comments are comparatively rare, while the 'emoji' reactions are less common still. Similarly, both 'replies' and 'quotes' are rare in the Twitter data. Overall, the number of interactions per post is higher on Facebook, with the median number of likes on a Facebook post reaching 13, compared to just 5 on Twitter.

4.4.1.4 Types of Posts

A comparison between different types of posts is also informative about modes of engagement. The format or type of post significantly impacts levels of interaction. On Facebook, museums overwhelmingly published posts with photos, these

¹⁰⁰Notably, these tables show deciles as opposed to the quartiles seen in earlier studies. As some interactions are rare, even within this large dataset the long-tailed distribution means that the vast majority of posts will never receive them. With this kind of distribution, quartiles are uninformative as all but the reported maximum would be reported as zero or one. Reporting deciles provides a more fine-grained understanding of this particular distribution.

4.4.1.4. Types of Posts

Interaction type	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
Likes	0	1	3	6	9	13	19	29	47	101
Shares	0	0	0	0	1	2	3	4	8	16
Comments	0	0	0	0	0	0	1	2	4	10
Love reactions	0	0	0	0	0	1	1	2	5	12
Wow reactions	0	0	0	0	0	0	0	0	0	1
Haha reactions	0	0	0	0	0	0	0	0	0	0
Sad reactions	0	0	0	0	0	0	0	0	0	0
Angry reactions	0	0	0	0	0	0	0	0	0	0
Caring reactions	0	0	0	0	0	0	0	0	0	0
Overall reactions	0	2	5	8	12	18	27	40	67	144

Table 4.11: Deciles of different types of interactions with museums’ Facebook pots.

perform well and have the same average number of interactions as native video (Figure 4.21). However, live video performs the best on average – significantly outperforming embedded videos from other platforms such as YouTube. This is likely due to the recommendation algorithm on the platform. Edson Tandoc and Julian Maitra highlight that a change to this algorithm in 2014 ‘prioritized Native Videos, or videos directly uploaded on the platform, over other posting formats, such as link and photo posts’ (2018, 1680). This is likely due to the fact that for embedded video-players from other sites such as YouTube, monetisation, views, and content rights are handled by third parties. This may explain why the amount of engagement seen on videos native to Facebook is higher than other types of videos.

Notably, links – frequently to museums’ websites and event booking pages – are also common yet receive significantly lower levels of interaction on average than photo posts. This is also likely influenced by the recommendation algorithm. Joe Vaugh from the Museum of English Rural Life acknowledged the the impact this has on museums.

In recent years, social media platforms have grown hostile to hyperlinks – for example, when you tweet a link to an event on your website. That’s because these platforms are driven by advertising revenue and it’s not in their financial interest for you to click off to another site. So, they downrank and “deboost” posts with links, which is a pain for users trying to share and promote web content. (Vaughan 2024)

It is in part for this same reason that YouTube videos are less successful than

4.4.1.4. Types of Posts

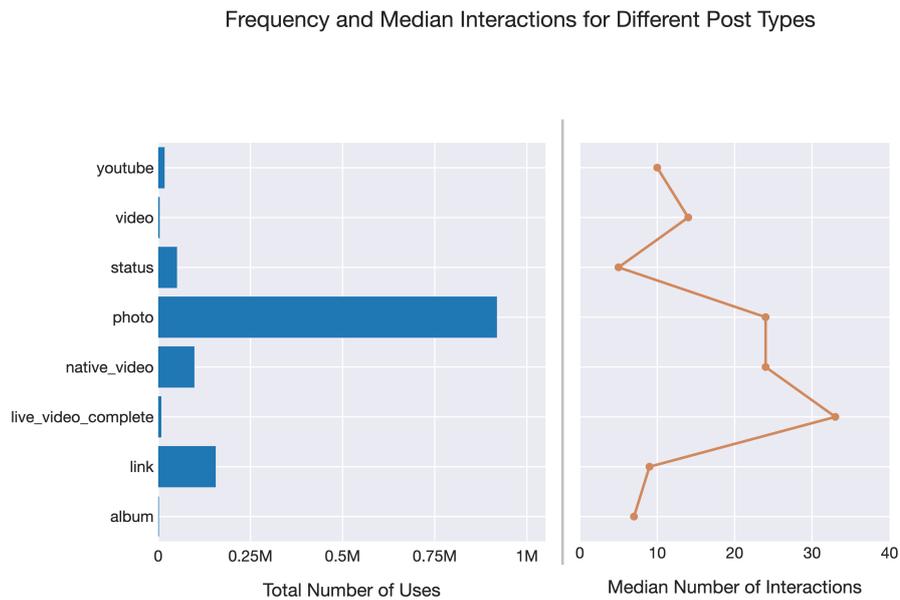


Figure 4.21: Use of different types of Facebook post types alongside their median levels of engagement.

videos native to Facebook. These posts enable users to ‘breakout’ of a social media session, interrupting the infinite scrolling loop that is carefully cultivated to maximise the time spent on a platform (Rixen et al. 2023). External links lead to long breaks from the platform, and thus reducing advertising revenue.

However, this ‘deboosting’ of links may be especially acute in the museum sector.¹⁰¹ It has been theorised that ‘poor quality’ links, are penalised by the recommendation algorithm (Barsaiyan and Sijoria 2022). In trying to reduce spam and fraud, social media platforms and search engines have adopted a number of complex evaluation criteria for whether a post should be shown to larger audiences (Aswani et al. 2018). Disingenuous e-marketers and sellers have attempted to game the system by creating ‘link farms’, where websites are created for the sole purpose of providing links to other websites to make them appear more legitimate in the eyes of platforms’ evaluating algorithms.¹⁰² Suspicious activity, such as many links to poor-quality websites, results in these posts being recommended to fewer users. Similarly, if a webpage has too few links, it is also classified as ‘poor-quality’. Considering how difficult it was to identify the correct museum

¹⁰¹When discussing the biases introduced by the Facebook API, Justin Chun-Ting Ho (2019a) identified that links are de-prioritisation in the returned data and are therefore under-represented.

¹⁰²The result of this is an endless game of cat and mouse between platforms and marketers, as increasingly sophisticated link pyramids, link wheels, wiki links, and private blog networks, are utilised to best the ever-changing SEO and recommendation systems (Ghosh et al. 2012; Aswani et al. 2018).

website through search engines, it may be that many museum websites – especially amongst independent museums – are not linked to (or back-linked) from a wide variety of sources. Thus, when a post links to the museum’s own website, it falls foul of the evaluation criteria.

There are other reasons that posts containing links might not have high average levels of interactions. Many of these posts are effectively advertisements for purchasing tickets and offer little to purely online visitors. This tension between what museums repeatedly post and what online visitors engage with will be explored at length in the analysis of the content of posts (p. 172).

Moving to Twitter, the visualisation highlights that the data gathered from the Twitter API provides less information in comparison to Facebook posts (Figure 4.22). However, it is possible to make comparisons between museums’ original tweets, retweets, and replies. Figure 4.22, highlights that museums’ original tweets receive four times as many interactions on average than replies. The majority of replies in the dataset were a form of one-to-one communication, answering individual visitors’ queries. It is not surprising then, that these direct communications see significantly less interactions than posts that address visitors more broadly.

Frequency and Median Interactions for Different Tweet Types

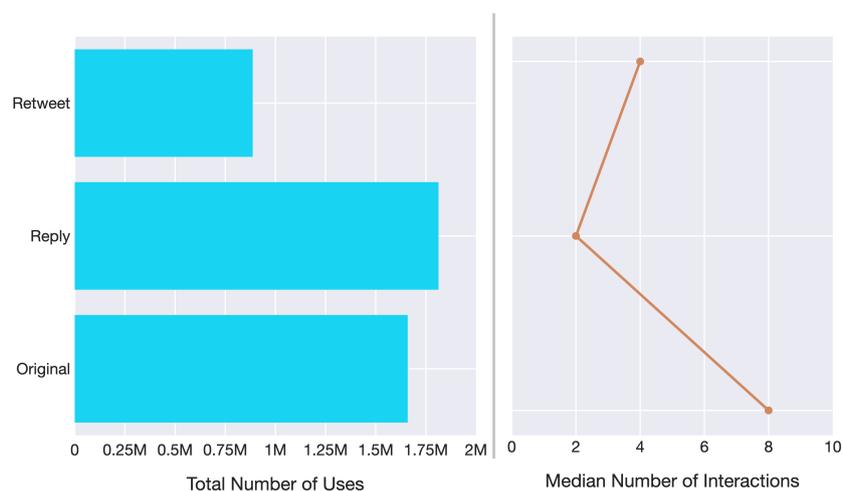


Figure 4.22: Use of different types of tweets alongside their median levels of engagement.

It should be noted that retweets are notably different to the previous two categories. While they are included in this dataset, the tweets themselves do not necessarily originate from a museum account but have merely been reposted by

museums. The interactions the API provides for retweets include *all* of the interactions with the tweet, not just those on the museum's retweet. This means the interaction numbers for some retweets are unusually high – if a museum retweets a popular tweet, in this dataset all of the interactions on that tweet are attributed to the museum. Retweets have therefore been excluded from the calculations and visualisations in this study unless explicitly stated. Museums that have been retweeted by other museums, however, are captured in the data under 'original tweets', this type of inter-museum interaction is explored below.

4.4.1.5 Network Analysis of Mentions

While retweets are excluded from most visualisations in this study, by drawing links between accounts, they open a new form of analysis. A network was built using Gephi (Figure 4.23), using the circle pack layout. This provides a hierarchical view of the network of UK museums on Twitter, and also includes all of the additional accounts they have retweeted from. The clustering here is based on several node properties, in this case, community, followed by the in-degree and the betweenness centrality.

The communities detected in the network are strongly aligned with geographical locations within the UK. Most notably, there are clusters grouping museums, councils, and tourism agencies from Wales, Scotland, Yorkshire, Liverpool and Birmingham.

Interestingly, we also identified a community including museums related to the Armed Forces, such as the RAF museum (light pink). This community also includes several Tory members, such as Rishi Sunak and Suella Braverman, indicating a strong interconnection between right-wing politicians and army-adjacent cultural venues. This community is also relatively isolated. This will be returned to in the discussion as it helps contextualise the popularity of museums with war-based collections on social media. However, transport museums, which are similarly successful and are theorised by interviewees to have a distinct online community (p. 232), surprisingly do not emerge as a distinct group in our network analysis.

The weakly connected nodes in the network mostly included non-museum institutions and accounts, such as the BBC, Heritage Fund UK, and Kids in Museums. The accounts of funders across the cultural sector are well-connected, while the Royal Academy was the best-connected museum account. These accounts also had more out-degrees than in-degrees – more accounts retweeted them than they retweeted. However, while this may be true in reality, for non-museum accounts

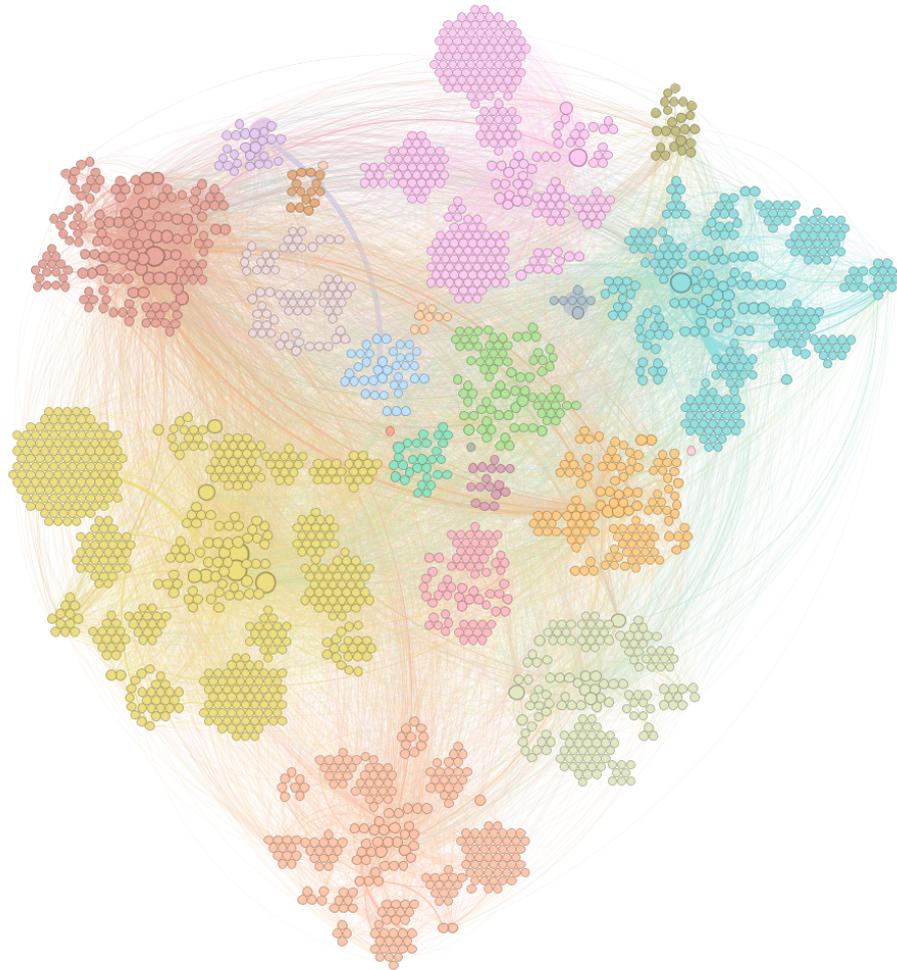


Figure 4.23: Twitter interaction network based on mentions.

it is a consequence of the data collection. By only using museum tweets, the study does not capture when a non-museum account, like the BBC, retweeted museums. As a consequence, it was not easy to distinguish the museum accounts that were most influential outside of the museum sector. However, by filtering for a least one in-degree – that is, limiting the list to accounts that had retweeted another – it was possible to reduce the list of influential accounts to just museums within the dataset.

4.4.1.6 Posting Frequency

In addition to the types of posts, post frequency may also affect engagement. Museums that post more will clearly have higher levels of total interaction (see Appendix B). However, comparing the total number of posts to the average num-

ber of interactions on a post, we can see that there is only a very weak positive correlation (Figure 4.24 and 4.25). This is particularly fascinating considering the amount social media influences who have highlighted frequency of posting as crucial to success, in part due to the recommendation algorithms prioritisation of new content and active channels. While museums who post more received more interactions overall, they did not necessarily have higher levels of interactions per post.

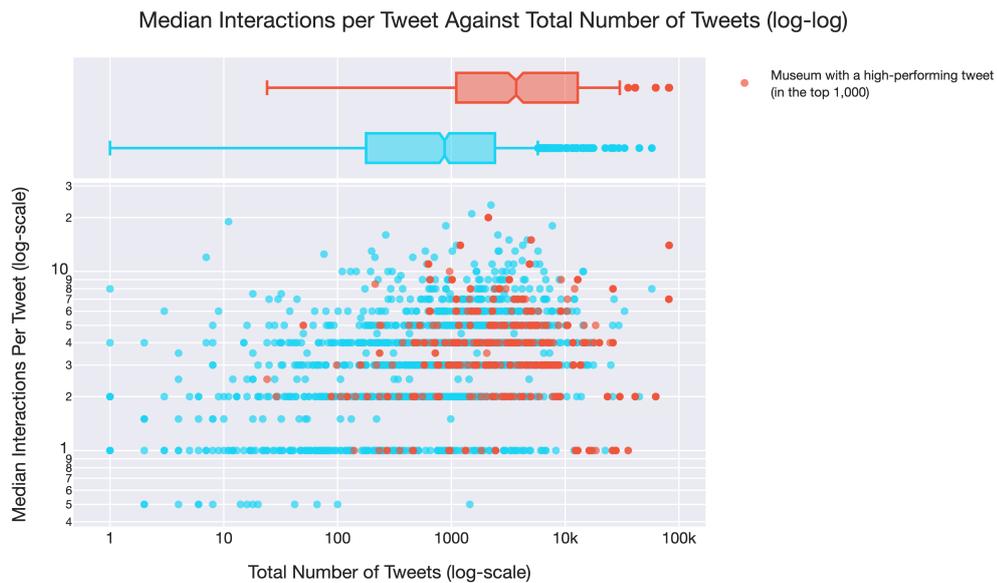


Figure 4.24: Median number of interactions vs. total number of tweets. Museums that posted a top-1000 tweet have been coloured in red. Respective distributions are also given in the whisker plot.

However, this is perhaps explained by the fact that museums who post more are more likely to have very high performing posts. On Figures 4.24 and 4.25, museums who have one of the top performing 1,000 posts from either platform dataset have been highlighted in red. These high performing posts are more likely to originate from very active accounts, this is true of both platforms although the effect is more prominent on Facebook.

4.4.1.7 Changes in General Levels of Engagement Over the Pandemic

Having established a baseline for posting habits across both platforms, the key question is how levels of interaction changed over the pandemic, and whether heightened levels of activity resulted in more engaged audiences.

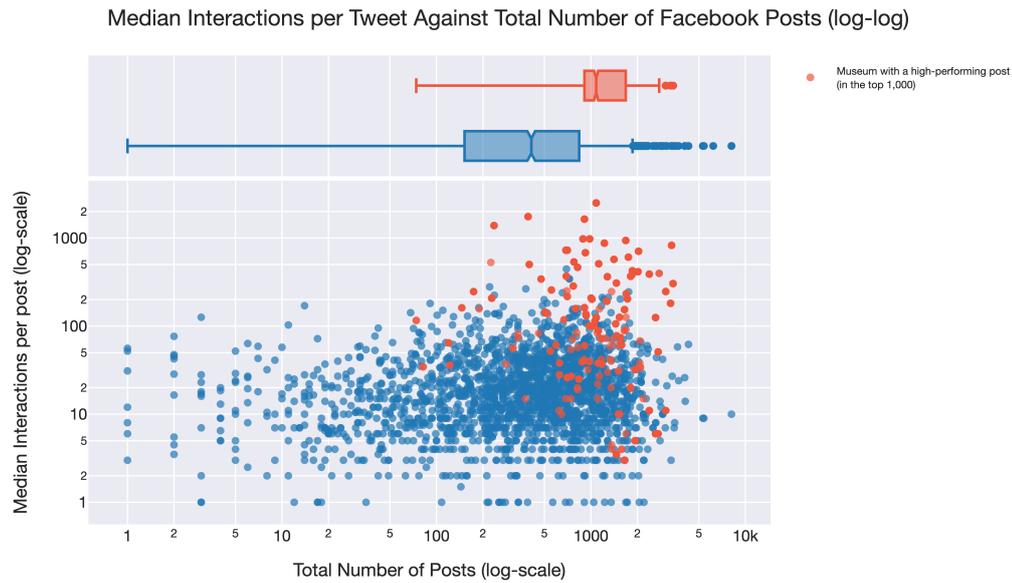


Figure 4.25: Median number of interactions vs. total number of posts. Museums which have posted a top-1000 Facebook post have been coloured in red. Respective distributions are also given in the whisker plot.

As was to be expected with an increase in activity on Twitter, the total number of interactions museums were receiving on their original tweets and replies grew in March and April of 2020 (Figure 4.26). The median number of interactions per original tweet peaks at 10 in 2020 compared to just 7 in 2019. Peaks in the median number of interactions align with lockdown periods, with the median returning to its peak of 20 in January of 2021. In comparison, interactions on replies did not rise beyond the usual pre-pandemic variation during the first lockdown period, although the low number (1 and 2 respectively) makes this difficult to assess. Therefore, despite the increase in replies museums were posting, there is no evidence to suggest that museums shifted towards sustained dialogue with visitors on the platform.

However, as noted during the discussion of the distribution, the interactions are very unevenly distributed amongst museum accounts. Amongst replies in particular, there were extreme outliers. As a result, the mean number of interactions per reply more than doubled between February and March of 2020 – rising from 9.4 to 22.6 interactions per reply, even though the median remained relatively stable.

On Facebook, a different pattern emerges. Despite there not being a dramatic increase in activity over the pandemic, the overall number of interactions the sector saw rose significantly. Figure 4.27 highlights that the overall amount of engage-

4.4.1.7. Changes in General Levels of Engagement Over the Pandemic

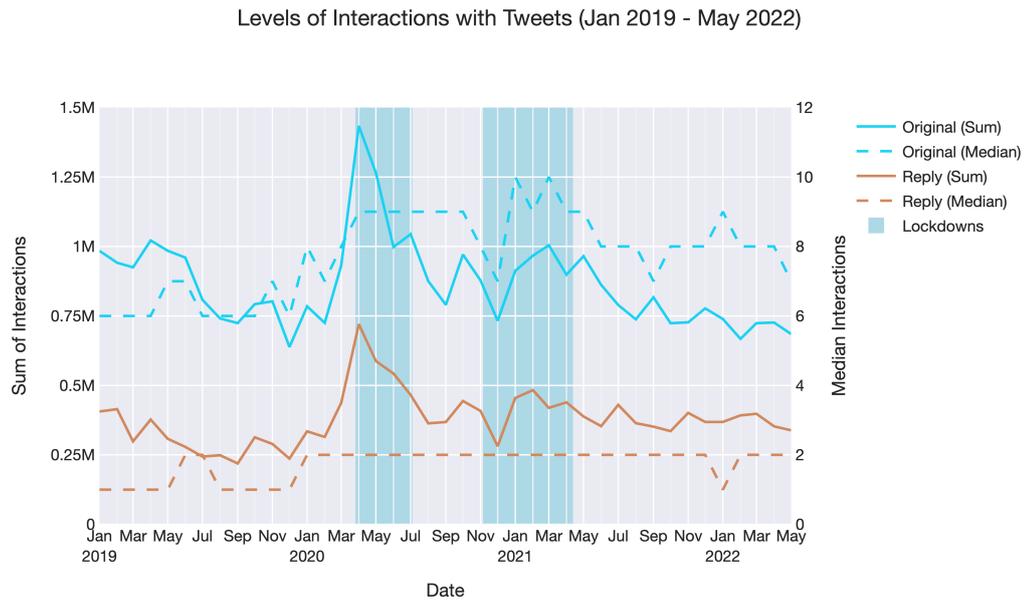


Figure 4.26: Sum (solid line) and median (dashed) of tweet interactions in the dataset, separated into replies and original tweets. Retweets have been excluded from this visualisation.

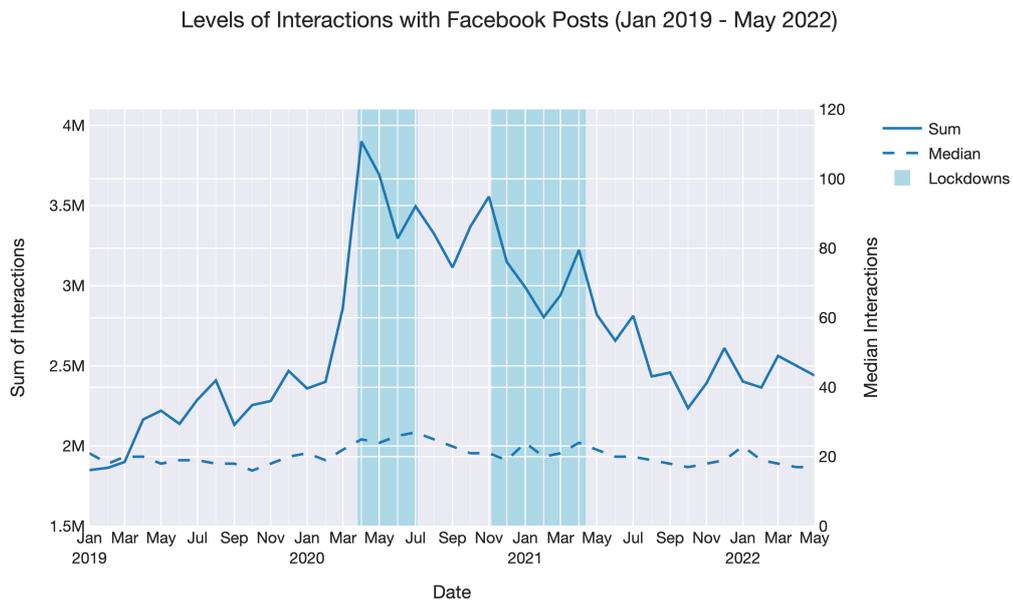


Figure 4.27: Sum (solid line) and median (dashed) number of Facebook post interactions.

ment with museums' posts rose sharply in April 2020, more than doubling during the UK's first national lockdown. Similarly, the median number of interactions per

post rose also rose – from 16 in February of 2020 to 25 in July of the same year.

Across both platforms then, there is an increase in the general level of interactions that museums saw. However, with only three years of data, there is a danger in extrapolating too much from the rise in engagement seen during 2020. In the case of the YouTube Study showed, the rise in views during the pandemic was merely a return to viewing figures seen in 2017 (p. 127). Without these older statistics, it is difficult to argue definitively that the pandemic marked a turning point, or significant shift in levels of interaction with museums online. At best, there is enough evidence to argue that, unlike on YouTube, average levels of engagement increased slightly, before returning to pre-pandemic levels.

4.4.2 High-performing Museums

4.4.2.1 Who Are the High Performers?

This section explores how different types of organisations performed, investigating the impact that size, organisational governance, region, and geodemographic characteristics of the local area, had on levels of interactions with the museums' posts.¹⁰³

To capture average levels of engagement, I summarised each account by looking at the median number of interactions per post and then explored the distribution of these medians between museums' attributes. This method, while imprecise, allowed the exploration of the data at a museum – not post – level and meant that these visualisations were not dominated by museums who posted very frequently. It also allowed the identification of outliers who were generating higher levels of interaction compared to their peers the top ten of which have been labelled.

4.4.2.2 Size

On Facebook, the median number of interactions per post was noticeably higher for huge organisations. This reinforced the findings of the Pilot Study, which identified a strong correlation between the size of the museum and the number of followers they have across Facebook, Twitter, Instagram, and YouTube. However, the relationship is less clear cut in this larger study (Figures 4.28 and 4.29). On Facebook, small museums receive more interactions on average (21) than their

¹⁰³The heavily skewed distribution of the data means that describing a distribution using a box plot necessitates log axes. For legibility and ease of comparison, the medians have been visualised instead.

medium sized counterparts (15). This is likely because of the inclusion of the 2,471 non-accredited museums. These museums tend to be smaller, with fewer resources than their accredited counterparts. It is possible that many of them are reliant on umbrella accounts from local councils for their online presence – as highlighted in the methodology. Therefore, while it is initially surprising that they have higher levels of median engagement than medium-sized museums this may be accounted for by their reliance on larger organisations' accounts. It is also true that the least digitally proficient museums are entirely reliant on social media to maintain their web presence – many do not have a website of their own (p. 116). Online audiences are therefore channelled into a single platform, which presents the only way of interacting with that museum online.

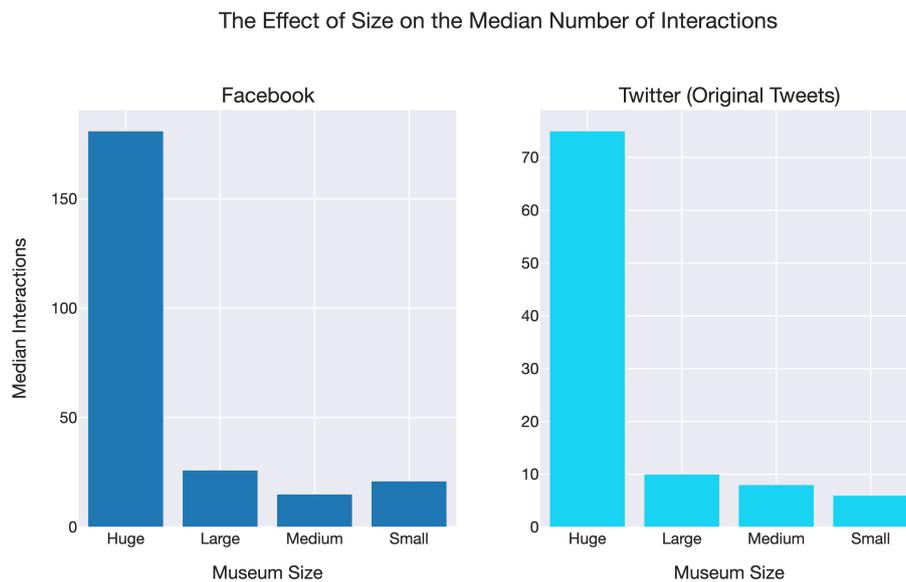


Figure 4.28: Median number of interactions with museums' posts, separated by size. Only original tweets are shown.

The differences on Twitter are less stark, as with far fewer interactions overall, there is less variation in the amount of interactions different types of museums receive. However, while large, medium and small museums perform comparably, huge museums do not see as much interaction. There appears to be large differences in social media strategies between different sized organisations. The ratio of replies to original tweets is highest for small museums (0.69), followed by medium (0.67), large (0.56), and finally huge museums (0.16). This indicates that smaller museums have adopted a somewhat more participatory relationship with communities on Twitter. The lack of replies from huge museums aligns with the fact that huge museums are less active on the platform – especially compared to

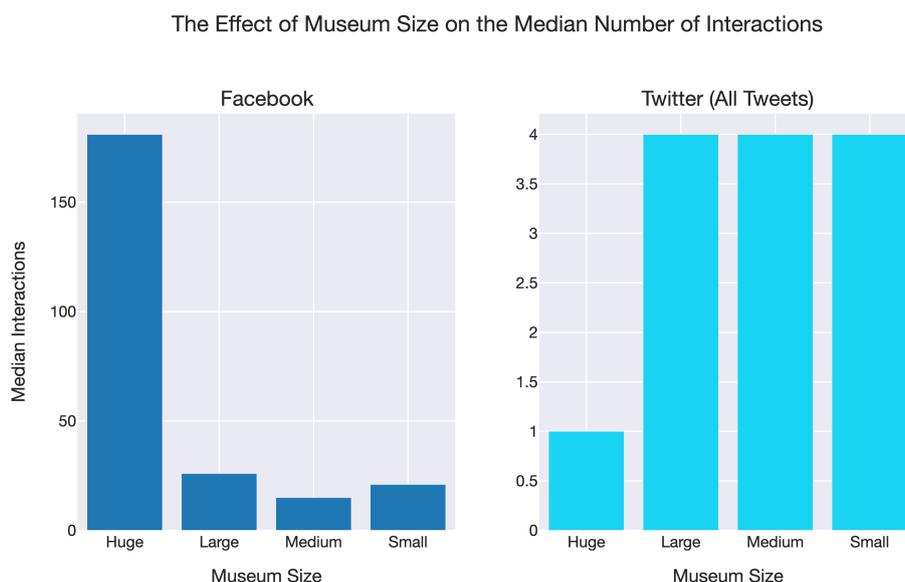


Figure 4.29: Median number of interactions with museums’ posts, separated by size. All tweets are shown, including replies.

small and medium sized museums – which may have contributed to their lower levels of average engagement.

4.4.2.3 Regions and Geodemographic Descriptors

Figure 4.30 explores how the average number of interactions a museum receives shifts across the UK. Notably, the small number of museums in the Channel Islands and the Isle of Man – even within this larger dataset – has resulted in the median number of interactions differing significantly to those of England, Scotland, Wales, and Northern Ireland. The grouping of museums by geodemographic descriptors in Figure 4.31 therefore represents a more useful comparison.¹⁰⁴

On Facebook, (Figure 4.31, dark blue) median levels of engagement are highest for London museums, and remain high for rural areas, while it is lowest for areas with industrial legacies. On Twitter however (Figure 4.31, light blue), the comparative levels of engagement with museums in Ethnically Diverse Metropolitan areas increases significantly compared to other geodemographic descriptors. Notably, the two best performing descriptors, London Cosmopolitan and Northern Ireland Countryside on Facebook, are two of the worst performing on Twitter.

¹⁰⁴These descriptors are explained in Section 3.2.2, and form part of the Mapping Museums dataset.

4.4.2.3. Regions and Geodemographic Descriptors

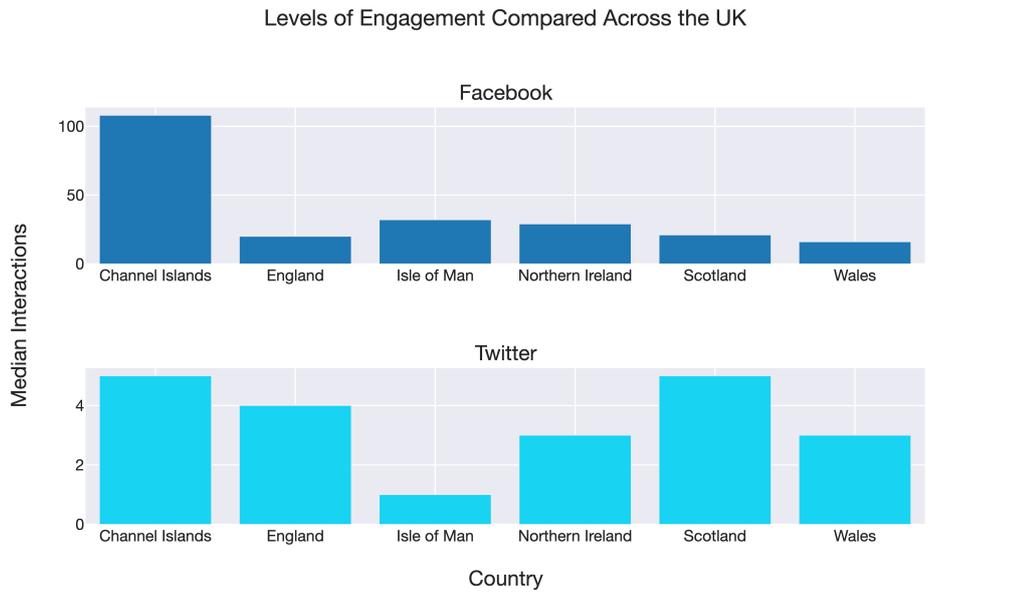


Figure 4.30: Median number of interactions with museums' posts and tweets, separated by country.

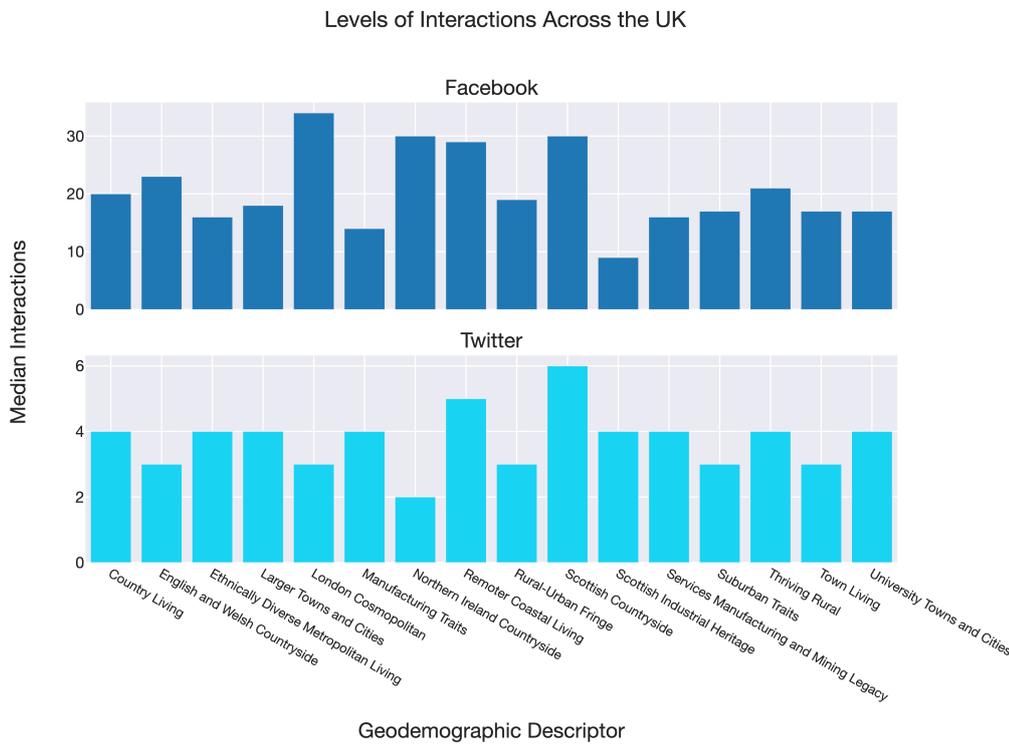


Figure 4.31: Median number of interactions with museums' posts and tweets, separated by geodemographic descriptors.

This may be a result of different levels of adoption of the two social media platforms amongst different demographic groups; Facebook users are on average older than those found on Twitter (Ofcom 2021). As the average age of the rural population in the UK is higher than the urban areas (Department for Environment, Food & Rural Affairs 2021; National Records of Scotland 2021), the difference in platform use between age groups may have contributed to these differing levels of engagement. As mentioned in the Pilot Study, the bias towards older online visitors identified in the study is likely exacerbated by where museums are posting (Walmsley et al. 2022). However, it is difficult to unpick the many contributing factors. Looking through the frame of the posts themselves, many of these high performing rural museums situated in national parks with beautiful landscapes and therefore have higher levels of engagement because they post beautiful images – a theory put forward by a participant during the interviews.¹⁰⁵ Alternatively, their success could be attributed to the fact that they disproportionately rely on umbrella organisations, and benefit from this shared digital infrastructure and resources.

4.4.2.4 Governance

However, it is not a given that associating with a larger group leads to higher levels of interaction and there is a lot of variation between types of museums. As Figure 4.32 highlights, museums run by local authorities see far fewer interactions with their online visitors. Unlike larger museum groups, local authorities' social media accounts often post a wider variety of content. This can range from notifications about bin collections to reminders of local services. In comparison with museum groups, a large proportion of people seeking out their local council will not be searching for cultural activities.

Nevertheless, in a parallel to the previous findings on rural Scottish museums, museums governed by Historic Environment Scotland also performs well on Twitter with a high number of average interactions (Figure 4.32). The second highest performing category on Twitter was 'Other', which is also the top performing group on Facebook with a median of 80 interactions per post. These museums are predominantly independent charities and lack official associations with large museums groups or local councils, they are also more likely to be small museums.

¹⁰⁵Images were not captured as part of this dataset and it has not been widely discussed in relationships to museums, however, there is a wealth of literature that explores the types of images that receive higher levels of engagement; highly engaging images contain easily identifiable content (Philp et al. 2022), colourful, and high in sentiment, with negative sentiments generating more shares, and positive sentiments more likes (Li and Xie 2020; Peng 2021).

4.4.2.5. Engagement across Different Types of Collections

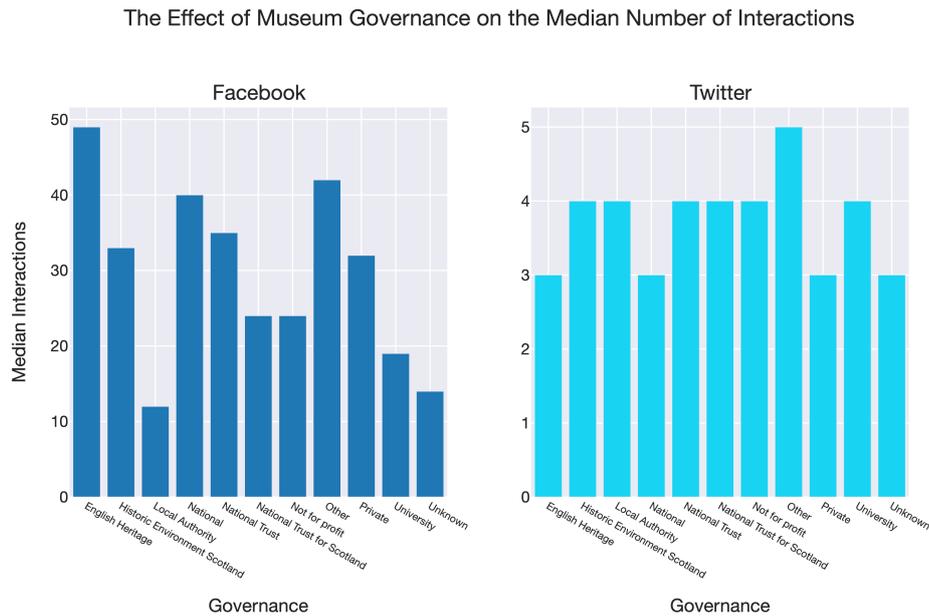


Figure 4.32: Median number of interactions with museums’ tweets, separated by governance.

Here, their high levels of online interaction may be due to the fact that they predominantly divert all of their online visitors to one platform. In addition, these museums tend to adopt participatory models, with more retweets and more comments on their posts, meaning that they have higher levels of engagement, even if their overall following is smaller.

These examples have highlighted the advantages of this larger dataset, which enables data to be further subdivided to explore how online interactions and digital strategies vary between types of museum. This was not possible in the Pilot or YouTube Studies as the subdivision would not contain a sufficient number of museums for a robust analysis.

4.4.2.5 Engagement across Different Types of Collections

The final category, ‘subject’, is based on what museums have in their collections, which was a category manually created by the Mapping Museums team which was previously discussed in the Pilot Study (Candlin and Larkin 2020). This rough categorisation enabled me to explore whether some types of museums – for example those that focused on art, or science and technology – had higher levels of interactions on average. This was done to create a benchmark against which it is possible to compare the relative levels of interaction produced by the topic and word frequency analysis. However, this approach has its limitations; a post

from the Historic Royal Palaces’ Facebook account would be categorised under ‘Buildings’, even if it was about the gardens and more suited to the subject ‘Natural World’. However, this shortcoming is offset by the usefulness of analysing tweets and posts at an institutional level, enabling us to identify particularly high performing institutions, which are not apparent when the dataset is divided using topic modelling.

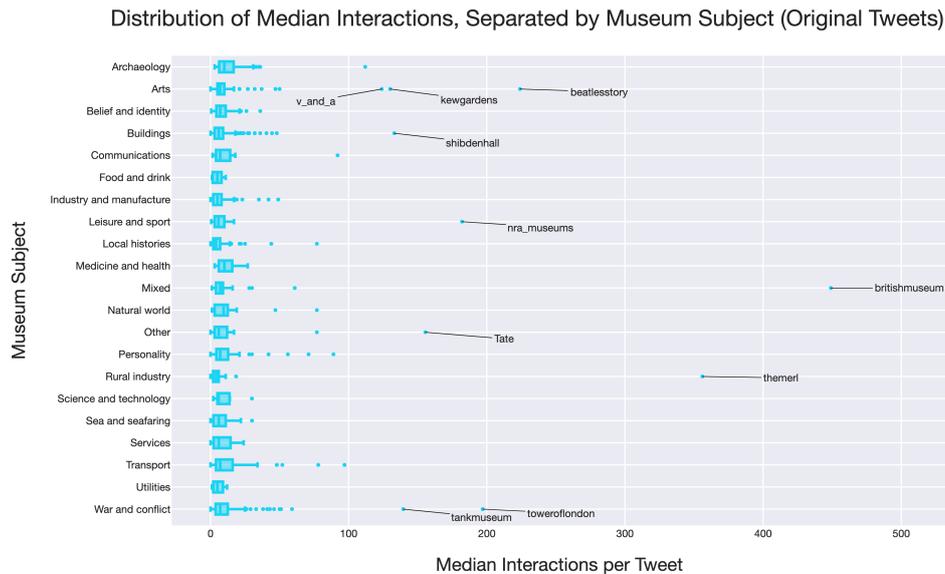


Figure 4.33: Whisker plot of the median number of interactions per tweet for each museum, separated by museums’ subject matter.

For Twitter (Figure 4.33 and 4.34), the British Museum had the best performing account, however, the most notable outlier is the Museum of English Rural Life (MERL) in ‘Rural and Industry’. The MERL has on average 356 interactions per tweet. Their success as a medium sized museum within the ‘Rural and Industry’ category is stark, especially when compared to the next most popular museum in the category – Acton Scott, the location of the BBC series *Victorian Farm* – whose average is 224 (Shropshire Council 2024). Adam Koszary’s viral tweets for the MERL are well known with the UK museum sector, and resulted in a brief tenure at Tesla following a tweet exchange with Elon Musk (Douglas and Koszary 2018; Deakin 2021). As mentioned in the previous section, the MERL was also one of the most responsive and interactive museums on Twitter and posted an enormous number of replies.

Overall, the top performers on Twitter are more likely to be medium sized museums than on Facebook, where large and huge museums dominate. The top-performing account in the Facebook dataset (Figure 4.35) was once again the

4.4.2.5. Engagement across Different Types of Collections

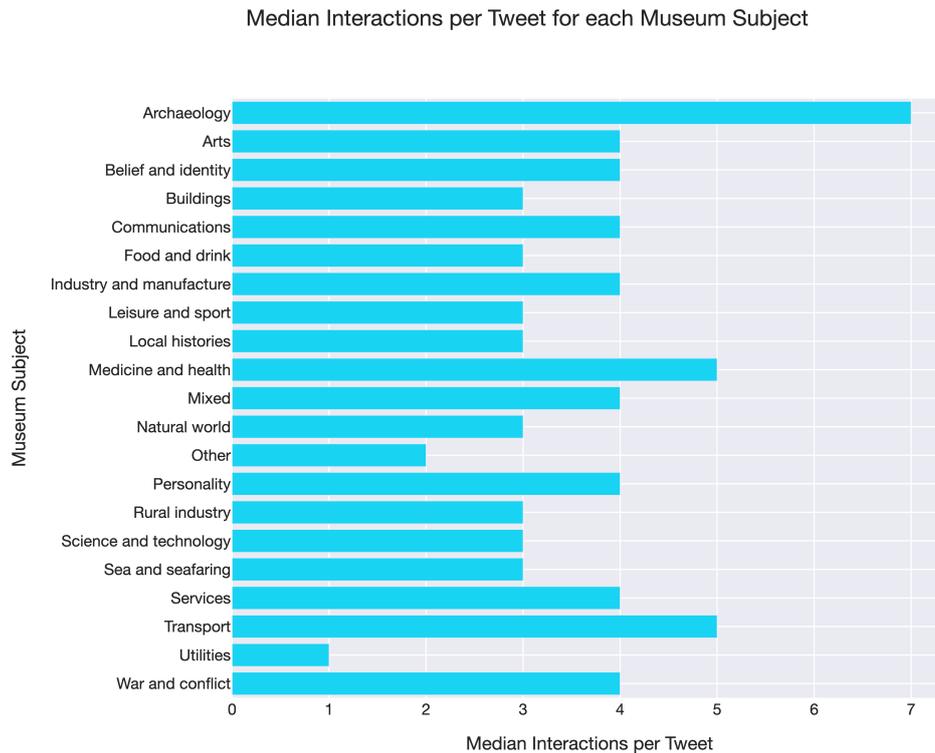


Figure 4.34: Median number of interactions with museums' original tweets.

British Museum. However, there was an over-representation of the War and Conflict category: the Tower of London; the Parachute Regiment and Airborne Forces Museum; and the Battle of Britain Memorial flight. The Airborne Assault Museums (previously The Parachute Regiment and Airborne Forces Museum or PARA Museum) is significantly smaller than the other three museums and has a particularly interesting digital strategy. The museum does not attempt to monetise its large online platform through ticket sales or by encouraging on-site visitors. Instead, the museum offers a premium membership, which offers online access to their archive and documents relating to military personnel (Airborne Assault Museum and To access Premium content 2025). 'War and conflict' did not perform as well on average but has a notable distribution. It is possible to see in Figure 4.35 and 4.36, that while its median is similar to 'Services', 'Archaeology', and 'Buildings', the top performing 50% of posts in the subject receive significantly more engagement resulting in a significantly higher third quartile (Q3) for 'War and Conflict'.¹⁰⁶ This indicates that the category contains many institutions who do not generate many interactions, but that those who do are often highly successful.

¹⁰⁶Interactive graphs which enable viewers to scale up these graphs are available through the author's GitHub: https://ellencharlesworth.github.io/phd_thesis

4.4.2.5. Engagement across Different Types of Collections

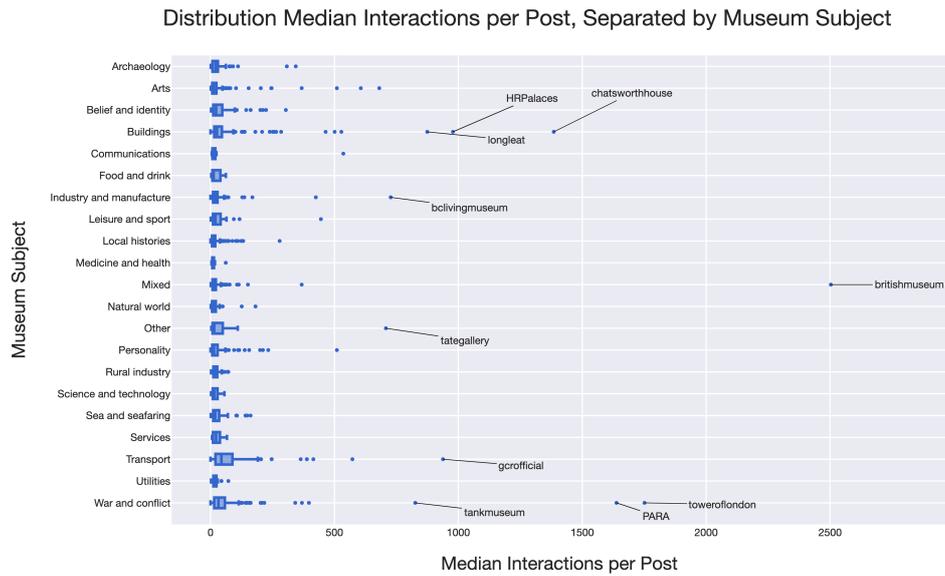


Figure 4.35: Whisker plot of the median number of interactions per Facebook post for each museum, separated by museums’ subject matter.

Due to the extreme skew of the data, the overall trends are easier to identify in the median levels of engagement for each subject, shown in Figure 4.34 and 4.36.¹⁰⁷ On Twitter, the best performing category is ‘Archaeology’ with a median of 7 interactions per post, while ‘Transport’ and ‘Medicine and health’ have 5, and ‘Utilities’ proved the least popular, with an average of only 1 interactions per tweet. On Facebook (Figure 4.36) museums’ whose focus is transport perform incredibly well, receiving more than three times as many interactions per post on average (57), compared to the average for the rest of the dataset (12).

It appears that Facebook and Twitter have two distinct profiles, and there are significant differences in the subject categories that are popular, reaffirming the findings of the Pilot Study. Both the ‘Natural world’ – which proved most popular in the Twitter dataset – and ‘Medicine and health’ are significantly less popular on Facebook. However, the notable exceptions are ‘Transport’ and ‘Local Histories’ which have similar levels of interaction on both platforms; while transport is in the top two subjects on Twitter and Facebook, ‘Local histories’ is in the bottom two categories across both platforms.

¹⁰⁷These are present in box plot, but are somewhat obscured by the scale.

4.4.3. Engaging Topics

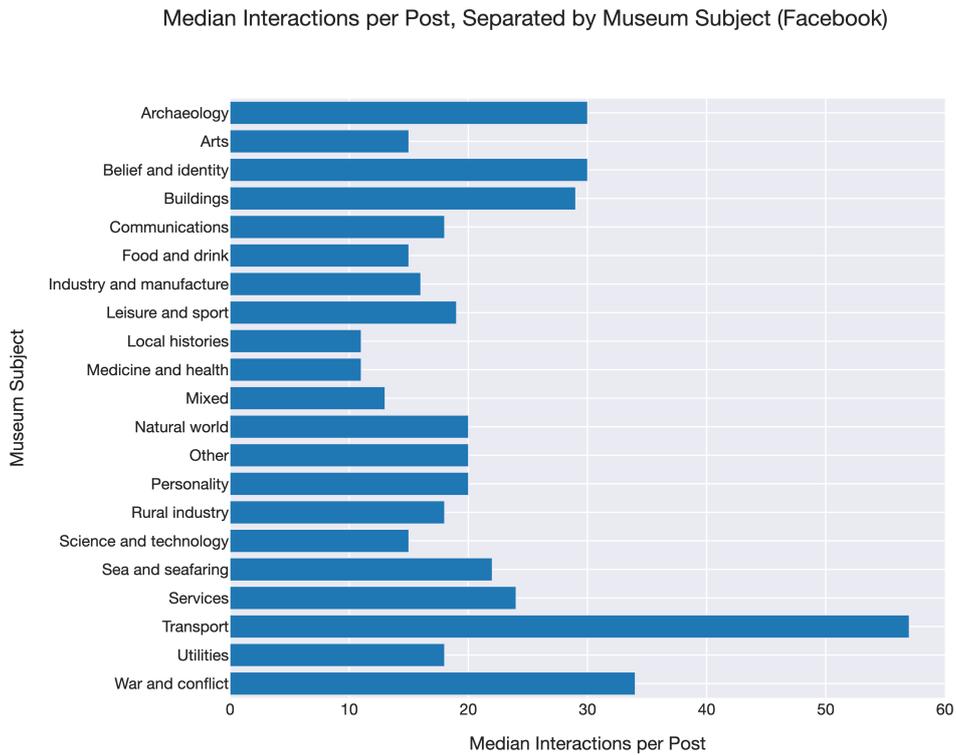


Figure 4.36: The median number of interactions for each subject on Facebook.

4.4.3 Engaging Topics

In order to investigate post subject matter, I adopted three different quantitative methods, each of which aims to compensate for the limitations of the other two. After doing a statistical analysis, I conducted topic modelling as well as performed a word frequency analysis to help with evaluation. Overall, topic modelling has been preferred and makes up the bulk of this analysis as it is able to capture the semantic meaning of the entire posts, as opposed to a single word. In addition to these two methods, on Twitter, I also conducted an analysis of the most popular hashtags.

4.4.3.1 Museum Hashtags

Hashtags, while only available on Twitter, represent a simple way to explore the content of tweets. Sector-wide hashtags such as #museumsfromhome, #curatorbattle, and #onthisday are the most commonly used in the dataset. More visualisations of the most commonly used hashtags (Figures C.1 to C.4) are provided in the appendices, where they are discussed in depth, but they reflect the expect-

ted and widely reported changes over the lockdown period (Appendix C). There is a particular spike in #museumsfrom home during the first lockdown period, and a significantly smaller spike when restrictions were reintroduced in the latter half of 2020. Over this period more general hashtags such as #museum and #heritage did not see large changes in use. The hashtags provide more insight when contextualised with the average number of interactions.

Celebrity

To explore this, I calculated the median number of interactions each hashtag received and have presented the top 20 in Tables 4.12 and 4.13. The first of the two (Table 4.12) includes all hashtags, even those that were only used once in the entire dataset. Here the top result #kimohno, stems from a sole tweet from the V&A whose text reads:

#kimohno became the principal item of dress for all classes and sexes in Japan from the 16th c. and is still a symbol of Japanese culture. Discover real kimono here at the V&A: <http://bit.ly/kimono-va>
#KimOhNo.

#KimOhNo was a hashtag created in response to Kim Kardashian's trademarking of 'Kimono' as the name of her new shapewear brand (Ho 2019b). This name was perceived as culturally insensitive and faced significant backlash from around the world provoking Kim Kardashian to rename the brand.

Other popular hashtags in the rankings were similarly tied to celebrity culture. The second and third entries were used in a single tweet by the Natural History Museum, which related their dinosaur fossils to the preferences of the Korean boy band, BTS.

We know birthday boy Jungkook of @bts_twt loves Brachiosaurus and Tyrannosaurus! You can see the T. rex in the Dinosaurs gallery on your visit, and brush up on brachiosaurs with our Dino Directory online:

https://nhm.ac.uk/discover/dino-directory/brachiosaurus.html?utm_source=tw-link-post-20210901-lp&utm_medium=social&utm_campaign=general

#HappyBirthdayJungkook #꾸기생일ㄷㄷ

Meanwhile, the fourth best performing hashtag similarly relates to a popular musician, and was about the acquisition of a cardigan popularised by Harry Styles for the V&A's collection.

4.4.3.1. Museum Hashtags

Rank	Hashtag	Interactions per tweet
1	#kimohno	19999.0
2	#happybirthdayjungkook	13607.0
3	#꾸기생일츄ㅋ	13607.0
4	#harrystylescardigan	11593.0
5	#unrelated	9980.0
6	#thispig	7111.5
7	#endsmearfear	5673.0
8	#giorgioarmani	3245.0
9	#wearevisible	3155.0
10	#thresholdday	3004.0
11	#dullcountrysidesnaps	2885.0
12	#johnlennon40	2432.5
13	#procedure	2401.0
14	#nhmtrexmas	2086.5
15	#royalvisitdundee	2064.0
16	#thesadbook	1839.0
17	#graysongiveaway	1761.0
18	#lucysparrow	1747.0
19	#sonnet16	1745.0
20	#josephlorusso	1722.0

Table 4.12: Top 20 hashtags with the most interactions across all museums' tweets, based on the median levels of engagement per tweet (excluding retweets and replies).

The first on the list to be unrelated to celebrity culture is #unrelated, which appeared in the following tweet from the Mary Rose Museum.

The Tudors used to treat venereal diseases by injecting mercury into the 'affected area'. Mercury is, of course, poisonous and these days nobody with any sense would suggest treating a virus with a deadly poison... #History #Unrelated

This tweet is directly tied to contemporary events and references the comments of then-president Donald Trump. In April of 2020, he was widely derided for suggesting that injecting disinfectant – a poisonous substance – into the body could be a cure for Covid-19 (BBC 2020a). The number of high-performing tweets that relate to current events and celebrity culture – including heated controversies – seem to suggest that engaging with contemporary events has the potential to massively increase the amount of engagement museums see online.

4.4.3.1. Museum Hashtags

Rank	Hashtag	Interactions per tweet
1	#yayoikusama	534.5
2	#internationaldinosaurday	341.5
3	#saraheverard	301.0
4	#abbeyroad50	282.0
5	#animerlcrossing	263.0
6	#thecolourroom	227.0
7	#turnersmodernworld	215.0
8	#beatlemania	195.0
9	#johnlenon80	194.0
10	#aubreybeardsley	193.0
11	#theyshallnotgrowold	188.5
12	#sunrisephotography	164.0
13	#vangogh	162.5
14	#theatreartistsfund	159.0
15	#diordesignerofdreams	156.0
16	#whm2020	154.0
17	#annelister	154.0
18	#nyhonours	152.0
19	#dorotheatanning	151.5
20	#hamlet	149.0

Table 4.13: Top 20 hashtags with the most interactions, if used by more than three museums, based on median levels of engagement per tweet (excluding retweets)

However, to better identify more general trends, Table 4.13 was produced to show the best-performing hashtags that has been used by at least three museums. This gives a sense of broader campaigns and their ability to increase engagement, expanding beyond individual organisations and exhibitions.

On this table, the artist Yayoi Kusama does particularly well. The arresting colours and optical illusions her installations have contributed to her virality on social media (Luke 2019). Van Gogh, who also appears on the list, is similarly famous for his use of colour. The importance of the visual in high levels of engagement is also clearly represented in the presence of #sunrisephotography. Unfortunately, storage constraints and limits on how much it is possible to download from an API have resulted in the exclusion of associated images from this dataset, however, their analysis – using the same techniques as the Website Study – would provide much needed insight on the visual attributes of these posts.

Returning to Table 4.13,¹⁰⁸ it seems that hashtags relating to more recent arts and

¹⁰⁸It would also be remiss not the highlight that dinosaurs, famously a favourite with museums'

culture – including fashion, games, film, and music – do particularly well. In some cases, engagement is likely bolstered by topical discussions surrounding a TV show or film; for example, *The Colour Room* – a film about the pottery designer Clarice Cliff released in 2021 – or Anne Lister, who is the subject of the 2019 TV series *Gentleman Jack*. Such an effect can also be created by current events, with for example the Queen’s New Year Honours list being ranked 18th.

News and Current Events

There is no way to easily segue to or from violence; to see a hashtag relating to the death of Sarah Everard was a surprise. Gender violence is an incredibly difficult to discuss in a public forum with sensitivity and sincerity, even more so on social media or within the confines of a thesis. Jenny Kidd highlighted the difficulties museums face in commenting on current news stories and discourse, reflecting on the benefits of providing a historical narrative (Kidd 2016). When, in 2021, Sarah Everard’s disappearance and murder at the hands of a serving police officer became national news, there were vigils and marches across the country, to ‘Reclaim these streets’ (BBC 2021; Sandhu 2021). Inspired by the ‘Reclaim the Night’ marches in the 1977, the People’s History Museum chose to highlight the inter-generational solidarity between women and the ongoing work of this movement.

The devastating news of #SarahEverard's disappearance resonates with so many. Decades of campaigning for safety has taken place and continues. #ReclaimTheNight marches started in 1977 and continue today across the world. <https://t.co/rx4mniq2c7>

This tweet – one of three relating to Sarah Everard in the dataset – highlights the role of museums in such circumstances, both as members of their community and as the keepers of our communal history.

The conditions of the pandemic, combined with the rise in prominence of the Black Lives Matter movement and the discussions surrounding the toppling of the Edward Colston statue in June 2020, saw many museums actively engaged with their local communities (Frost 2021; Siddique and Skopeliti 2020). The culmination of many years of work on accessibility and openness in the sector (Fraser

young visitors, appear second on the table (Anderson et al. 2008). Families and children are a key demographic group for many museums, and it is notable that if you look at hashtags used by 10 or more museums the focus of this list changes. These rankings show more widely used hashtags, and literature has high levels of engagement, with the list including #romeoandjuliet, #macbeth, #twelfthnight, and #JaneAusten – all of which are staples of the school syllabus.

2019), it became a key justification for museums' continued work during the pandemic as museums were cast as hubs and community spaces (ICOM 2020a; ICOM 2020b). Yet, it was only a small minority of museums that were found to engage with difficult topics and take an active role in these wider cultural conversations.

Discussions of the Black Lives Matter movement did not emerge at all during topic modelling, and only 805 tweets used the #BlackLivesMatter hashtag out of 3.2 million. For context, the hashtags #lego and #flowertable were more widely used. 237 museums used #BlackLivesmatter,¹⁰⁹ but the division between museum size is most telling. As the size museum decreases, so to do the proportion of museums that engaged with this discussion. 44.4% of huge museums used the hashtag, while 19.5% of large museums, followed by 12.9% of medium sized organisations. Only 8.4% of small museums used it. Interestingly, it was often not museums who initiated this conversation, as almost half of tweets using #BlackLivesMatter were replies (49%). The role of museums in such discussions is examined at length in the discussion chapter (p. 245). However, in both the topic modelling and hashtags, it appears most museums did not engage with the discussion.

4.4.3.2 Topic Modelling

This section will explore the results of the topic modelling, exploring how they both align and may contradict the discussion prompted by the analysis of hashtags.

Museums over Lockdown

How topics related to the pandemic have shifted over time is shown in Figures 4.37 and 4.38. On Twitter (Figure 4.37), spikes can be seen in the 'Reopening' topic at the end of the Covid-19 lockdown periods in the UK. The Facebook topics (Figure 4.38) show the cautionary approach many museums had to the pandemic; discussions of 'closure and opening' peaked a month before lockdowns came into place in 2020. As would be expected this topic peaks at when lockdown restrictions and introduced and again when lifted (Brown et al. 2021). The spike in December of 2021 coincides of great uncertainty, and many museums posted about their continued closure (BBC 2020b; Brown et al. 2021).

The visualisations highlight the impact the pandemic had on what museums were posting about; there was a large increase in posts about mental health, the history

¹⁰⁹Not all museum use Twitter, however this represents 7% of all museums and just 11.6% of museums on Twitter.

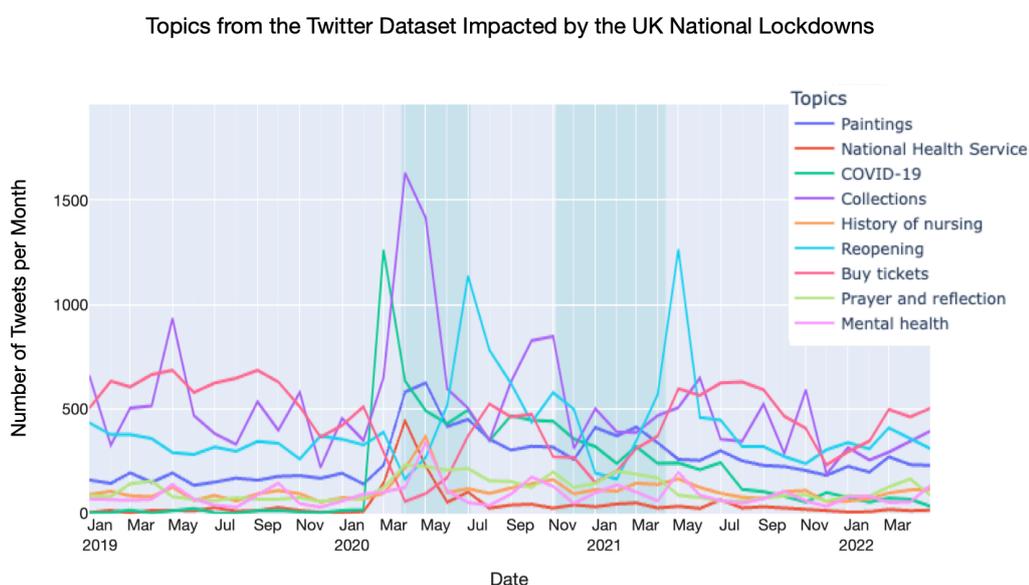


Figure 4.37: Impact of the UK national lockdowns (shown with blue shading) on the frequency of topics on Twitter.

of nursing and the national health service in March to May of 2020 on Twitter. Interesting in the second lockdown period there were significantly less posts on these topics. On Facebook, there are peaks in the number of posts about prayer at the start of each lockdown.

Collections vs. Events

There is also a clear increase in collections content – seen on both Facebook and Twitter. Interesting on both platforms, this topic has an inverse relationship to the frequency of posts encouraging people to ‘Buy tickets’. While museums’ sites were closed many posted more regularly about their collections instead of their upcoming programme, yet by the May of 2021, tweets about tickets had increased in popularity to almost pre-pandemic levels. This is interesting in the light of how few interactions posts about buying tickets attract. This shifting balance between collections content and advertisement is discussed at length with interviewees (204).

Amongst the most used topics (Tables 4.14 and 4.15), there is a contrast between what performs well, and what museums predominantly post about. The top five most frequently used topics on twitter are ‘Reopening’, ‘Thanks’, ‘Christmas Shop-

4.4.3.2. Topic Modelling

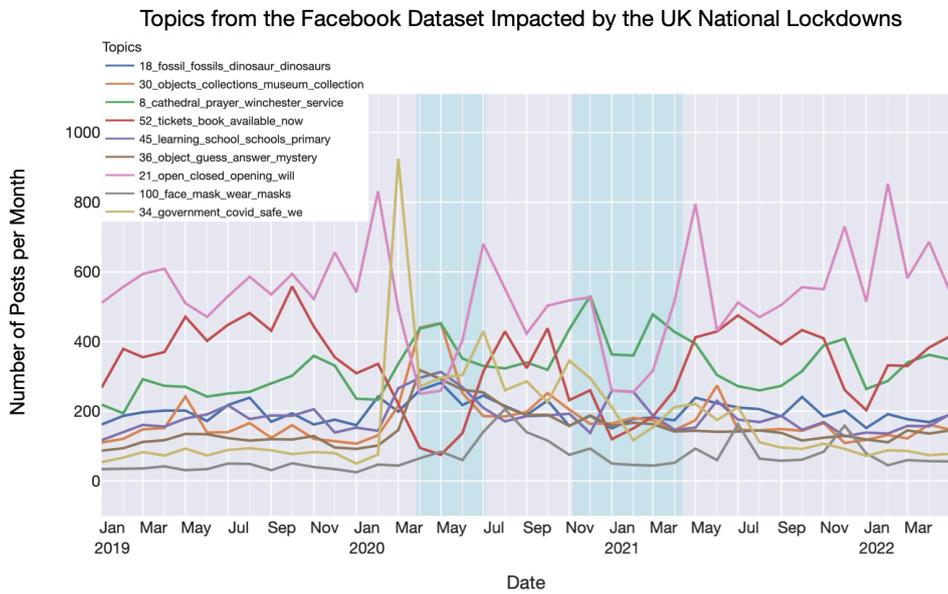


Figure 4.38: Impact of the UK national lockdowns (shown with blue shading) on the frequency of topics on Twitter.

ping’, ‘Buying tickets’, and ‘Coffee shops’ – the latter three of which are focused on encouraging people to spend money in the museum (Table 4.14). Apart from the ‘Reopening’ topic, the remaining four are in the bottom third of topics ranked by the median level of interactions. Notably, the very lowest performing topics are dominated by events, spanning leisure classes (median of 1), mindfulness sessions (3), film screenings (4), comedy events (4), and half term activities (4).

Engagement rank	Topic name	Representation	Median no. of interactions	No. of museums using the topic
96	Reopening	['open', 'reopening', 'opening', 'we', 'reopen', 'closed', 'will']	8	1338
185	Thanks	['thank', 'thanks', 'great', 'enjoyed', 'you', 'glad', 'sharing']	4	1338
166	Christmas Shopping	['christmas', 'festive', 'santa', 'shop', 'december', 'gift', 'gifts']	6	1331
144	Buy tickets	['tickets', 'book', 'available', 'now', 'ticket', 'booked', 'your']	6	1195
145	Café	['tea', 'coffee', 'cake', 'food', 'delicious', 'cafe', 'cream']	6	1189

Table 4.14: Top 5 topics used by three museums or more on Twitter.

This focus on events could be the result of the well-documented trend of museums seeing their online presence as an extension of the physical experience

4.4.3.2. Topic Modelling

Engagement rank	Topic name	Representation	Median no. of interactions	No. of museums using the topic
124	Opening	['open', 'closed', 'opening', 'will', 'we', '10am', 'be']	19	1845
116	Christmas	['christmas', 'festive', 'our', 'you', 'and', 'for', 'to']	20	1843
158	Art	['art', 'artist', 'exhibition', 'gallery', 'artists', 'of', 'by']	16	1703
152	Newsletter	['newsletter', 'you', 'news', 'we', 'to', 'it', 'mailchi']	17	1669
135	Café	['tea', 'our', 'delicious', 'you', 'and', 'we', 'for']	19	1575

Table 4.15: Top 5 topics used by three museums or more on Facebook.

(Bandelli 1999; Galani and Chalmers 2010; NEMO 2020b). This focus on events assumes that online audience could feasibly visit the site. Existing on-site visitors, or potential visitors who live close by, are the most likely to find these posts about events relevant, especially compared to a geographically dispersed online audience. This has likely contributed to the Audience Agency's finding that the demographics of online audiences closely mirror on-site visitors, as posting about on-site events ensures there is a significant overlap between the two (Walmsley et al. 2022).

Popular Topics

A full list of the 20 best performing topics on each platform are provided in Appendix D. The single most popular topic was the Beatles, aligning with the popularity of the hashtag and during the pandemic there was a resurgence in positive nostalgic music, which saw their song 'Here Comes the Sun' spend 50 days in the top 200 streamed songs on the music streaming service Spotify (Yeung 2023). Combined with the release of the Peter Jackson documentary *The Beatles: Get Back* in November 2021, the band was frequently in the news and trending on social media (Apple Corps 2024). Yet a broader look at the best performing topics – which will be supplemented by the hashtag analysis, and word frequency – would suggest that it is not a happy sentiment, but both high levels of emotional arousal that lead to interactions online. Previous studies have found that highly emotive posts are more likely to be shared on Facebook, an effect that is exaggerated on posts that inspire negative emotions (Ji et al. 2019). Nostalgia is often strongly associated with both loneliness and reactionary sentiments (Newman and Sachs 2020), and its role is discussed in the interviews chapter (p. 232).

The top performing topics on both Twitter and Facebook are disproportionately about war and controversy (pp. 174, 281). It is, however, debatable to what extent

the wide distribution of these posts – enabled by recommendation algorithms – is attributable to their involvement in current trends and the news cycles, and to what extent it is attributable to their arousal of negative sentiment. Considering their position as the topics with the highest average level of interaction, it may be the combination of the two which led to their the unusually high level of interactions.

This raises the important question of how this may change audiences' relationships to museums and their content. Museums have been criticised for adopting an unemotive 'pedagogical register', but is a highly emotive approach more appealing (Crang and Tolia-Kelly, 2010, 2315)? In the UK, museums have maintained a degree of public trust (BritainThinks 2013; Martin 2020), but it seems unlikely that social media would facilitate empathetic discussion about complicated and nuanced histories at scale. So, what might the consequences be if museums started creating content tailored to the recommendation algorithm – either geared towards entertainment or in this darker vein?

While some may argue that museums can co-opt social media as a tool for education, the scale of the issue becomes evident when looking at the top shared posts in the Facebook dataset which are characterised by loss and war (Appendix E). The three exceptions to this are a post about a baby owl, a nostalgic post about the discontinuation of Concorde – which although sad in tone, is significantly less upsetting than the other posts in the list – and the single most shared post, an art installation. 'Zobop' by Jim Lambie, consists of coloured stripes installed on the floor, and was considered controversial as the stripes effectively obscure the edge of the stairs visitors walk on (Figure 4.39). As such, comments centre on visitor's unwillingness to traverse the space, with many making jokes about how trying to use these stairs would lead to their death. Even the light-hearted posts then from this table, arouse negative sentiment or controversy in some way.

4.4.3.3 Word Frequency Analysis

In order to further investigate this, I analysed the relative engagement with posts containing words of interest. These words were chosen to represent five areas that were highlighted in the earlier results: transport, war, positive sentiments, museum' core objectives, commerce (i.e. tickets and gift shops). As mentioned in the methodology (Section 3.6.2.3), there are limitations to this regarding word choice, but in contrast to the black-box BERTopic algorithm it is a transparent methodology. While both Facebook and Twitter have been compared, it is worth noting the different scales. The average levels of engagement on Facebook are

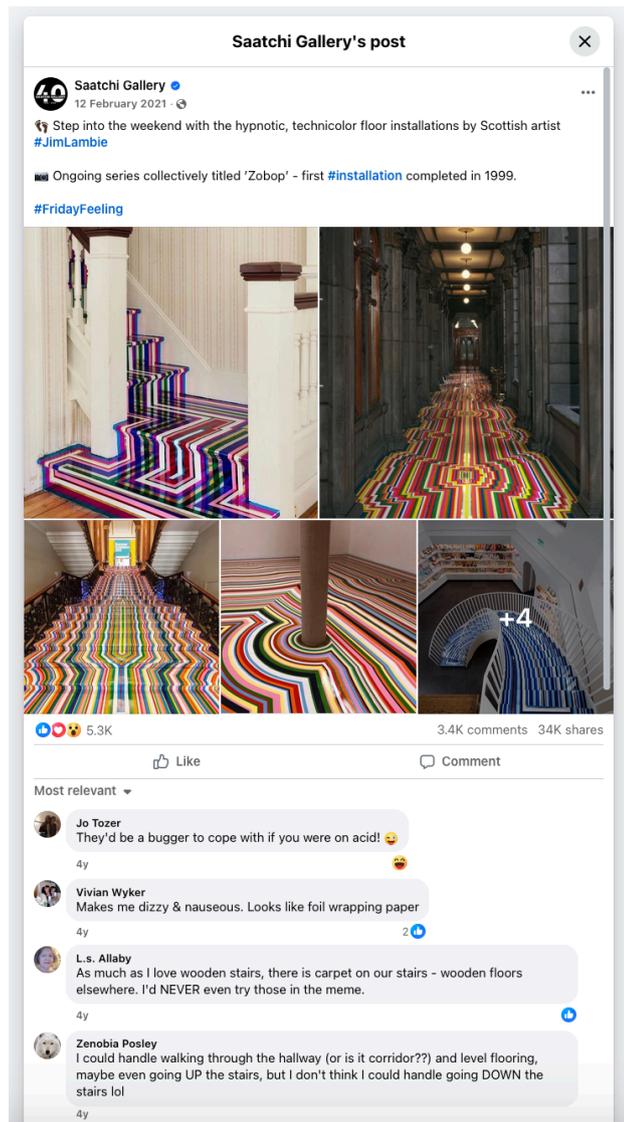


Figure 4.39: Screenshot of the Saatchi Gallery’s post about Jim Lambie’s ‘Zobop’ installation.

much higher than on twitter, and the differences between the reception of institutions and subjects are significantly larger.

On both Twitter and Facebook, the words associated with transport perform well, while posts containing words associated with war and conflict also receive higher than the average number of interactions. While investigating this trend, the second world war seemed to be a particularly popular subcategory of war and conflict.

Animals were chosen as a category as they occurred so frequently in the very top performing posts. There is a notable preference for cats over dogs on Twitter – kittens receive on average more than twice as many interactions than puppies.

4.4.3.4. Summary of Population Study

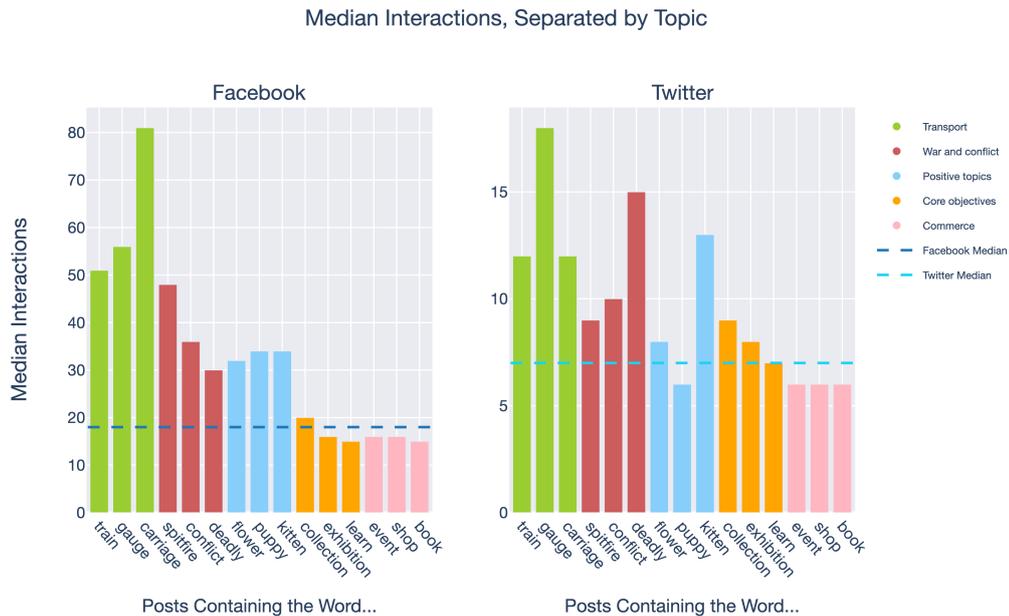


Figure 4.40: Median levels of engagement of tweets and Facebook posts containing words from four categories.

Cats of the internet, and the polarised discussion of *women* who own cats in online spaces, has been widely theorised (Evans and Riley 2023; Fryer 2022). In our data, this preference for cats on Twitter, is likely to be a result of the demographic differences between users on each platform.

The final two categories were chosen to investigate the distinction between collections content and advertising content identified during topic modelling. These categories do not have high levels of interaction, and on Facebook do particularly poorly. However, the results are not as clear as in the topic modelling, where commercial topics were the worst performing in the dataset. This highlights the limitation of using a few words as a proxy for a broad topic. However, Figure 4.40 shows comparisons between a range of collections and commerce terms, and here the distinction between collection and commercial content emerges once again. While the differences on Twitter may not seem as significant, when compared to the difference in medians between museum sizes (which ranges from 1 to 3 on Twitter), the differences between subjects shown in this figure are significantly larger.

4.4.3.4 Summary of Population Study

Ultimately, the Population Study has revealed a number of trends in UK museums' use of social media platforms during the pandemic. The resulting key findings

have been grouped into four sections:

Posting Habits over the Pandemic

- In 2020, significantly fewer museums posted to Facebook and Twitter than in 2019, however, those that continued to use the platforms were more active, leading to relatively stable numbers of posts on the platform.
- There was a significant increase in the number of museum replies museums were posting to Twitter. However, these were not sustained conversations, and overall levels of interaction on Twitter were lower than those on Facebook.
- During the first lockdown period – where museums were more active and making longer posts – the average number of interactions on Facebook posts doubled.
- Levels of posting and the average number of interactions returned to pre-pandemic levels in 2022 on both platforms.
- There is a distinct seasonal shift in posting habits of museums, with January being the time of year they upload the least frequently. This can easily be misinterpreted as an increase in activity due to the lockdowns (Spring 2020) if taken in isolation.

Differences between Museums

- There is a stark contrast between the best and worst performing accounts, with the vast majority of posts receiving very low levels of interaction.
- The posts of larger and huge museums perform better on average, although small museums outperform their medium sized counterparts.
- Accredited museums are more likely to have a social media account and to active on these platforms than their unaccredited counterparts.
- London museums are the top performers on Facebook, followed by countryside and coastal museums of Northern Ireland and Scotland.
- When separated by subject, the outlying Facebook accounts which received high levels of interactions were disproportionately museums with collections focused on ‘War and Conflict’.

- However, when looking at the median – not the outliers – Transport museums had the most interactions on average.
- The retweets suggest that museums regularly collaborate with geographically close institutions – predominantly council-run organisations and tourist boards.
- Network analysis also revealed that military museums were regularly discussed and retweeted by conservative politicians.

Platform Constraints

- Posting more often does not significantly improve average levels of engagement; however, viral posts primarily originate from museum accounts that post frequently.
- The form of posts made a difference in levels of engagement, with video posted directly to Facebook receiving the highest average levels of engagement on Facebook, outperforming photos or live videos. ‘Link’ posts perform particularly poorly.

Post Content

- There was a significant gap between what performed well and what museums posted about frequently.
- Collections content had above average levels of interaction, while posts about programming – events, shops, tickets, learning, and exhibitions, received lower than average levels of interaction.
- The hashtags with the highest levels of interaction relate to celebrities – out of the hashtags that were widely used, those relating to recent popular culture received on average the most engagement.
- Highly emotive and controversial content is the most widely shared.
- Only a small portion of museums had engaged with the discussion around the Black Lives Matter movement.
- Much like the YouTube Case Study, the Population Study has highlighted just how influential the recommendation algorithms are on online engagement. It has additionally raised a number of ethical questions about museums’ participation in these online ecosystems.

4.5 Website Study

This study represents a preliminary exploration of the museum URLs gathered as part of the data collection pipeline. The aim of this study is to further contextualise the findings of the research on social media, as such, it will:

- Establish how many museums have a web presence, and what form it takes – whether it is shared or independent and how it is hosted (WordPress etc.).
- Identify the availability of collections information and the infrastructure to support it (e.g. Collections databases).
- Identify the type of collections and institutions that are under-represented in the digital landscape.
- Explore the visitor experience through a comparison of the layouts of museum websites and collections pages.

Up until this point, this thesis has primarily focused on social media. However, there is a wide variety of experiences museums provide online. Yet despite this range – from virtual galleries, collections databases, community projects, and blogs – most are hosted on or linked to museum websites. Therefore, by looking at the websites – which were already gathered as part of the data collection for the previous studies – our understanding of what museums publish online is significantly expanded. However, due to time limitations, this study does not explore every facet of museum websites, and both virtual experiences and collections databased – as they are only used by a small number of museums – have been excluded from this study. The website data can easily be used to explore these topics, which would be a fruitful future direction of research.

4.5.1 The Prevalence of Webpages

The vast majority of UK museums can be found online to some extent. 97% of them have a webpage of some description – whether that is hosted by a larger organisation or an independent website – and that remaining 2% can almost all be found on Facebook.

Much like the social media results, the findings between the URLs of the Pilot Study and population studies differed. For the smaller sample of 315 museums, it was possible to manually tag each of the URLs and identify whether the museums' webpages were hosted by a larger umbrella organisation. In this study,

134 museums (42.5%) were reliant on umbrella organisations, and in 38.8% of cases this was by a local authority.

A further exploration of the html identified that a third of all museums acknowledged the support of a local authority on their website, which exceeds the number of museums identified as ‘local authority’ by the Arts Council (23.7%). This highlights the difference in reception between museums who are funded by local authorities – who are well documented in the wider literature – and the much wider body of organisations that are digitally reliant on resources and infrastructure provided by local authorities. The support provided to these organisations is not captured in official statistics, and as such, the importance of local authorities to the digital resilience of small organisations is greater than previously recognised. The increasing cuts to local council funding pose a threat to a wider range of museums than anticipated (Museums Association et al. 2020; Sandford and Brien 2024).

As the Population Study has a significantly larger number of URLs to check, instead of a manual validation, the URLs were used to identify umbrella organisations. Figure 4.42 shows the top ten most frequent host organisations in the dataset. Nation-wide museum groups – like the National Trust, English Heritage, National Trust for Scotland, and Historic Environment – make up the largest host organisations. However, while every National Trust property – 183 in the dataset – has a webpage on the National Trust websites, ten additionally run their own website which presents more detailed information about the museums (Figure 4.41).¹¹⁰ As a result, only 173 national trust URLs are shown in Figure 4.42.

A further exploration of the smaller groups, reveals that at least 34% of all shared URLs are run by local authorities. Unfortunately, due to the variety of naming conventions in council URLs, this is likely below the true number, and a more accurate figure would require manual verification. Although each local authority hosts between one and thirteen museums, cumulatively they host more museums than top four umbrella organisations – the National Trust, English Heritage, National Trust for Scotland, and Historic Environment – combined.

¹¹⁰While none of the interview participants came from this group of ten museums, a close reading of the sites appears to show two distinct advantages. The first is a greater flexibility around presenting collections, which on museums’ own sites can include innovative apps and interactive digital experiences that are not supported on the National Trust website. And secondly, a greater freedom in advertising events spaces, catering, online shops, and facilitating purchases beyond ticket sales. Further organisational factors are likely an influence, but these two factors are the most evident motivations identifiable from the websites themselves.

4.5.1. The Prevalence of Webpages

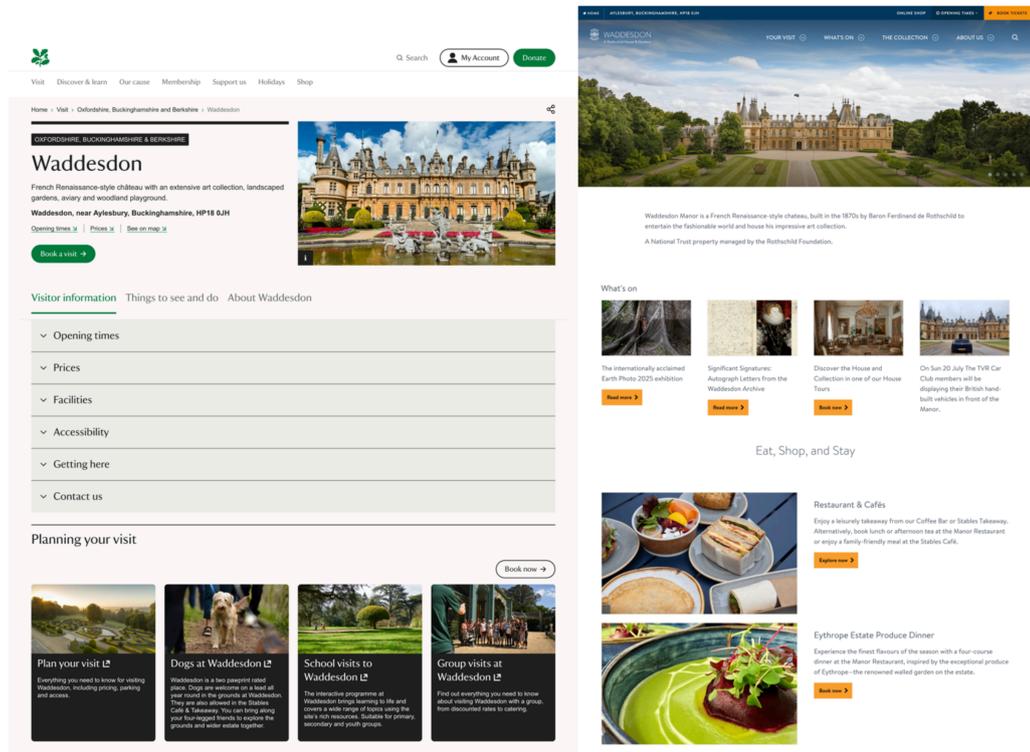


Figure 4.41: Comparative screenshots of the National Trust webpage of Waddesdon Manor and the Museum's own website.

Top 10 Most Common Umbrella Organisations

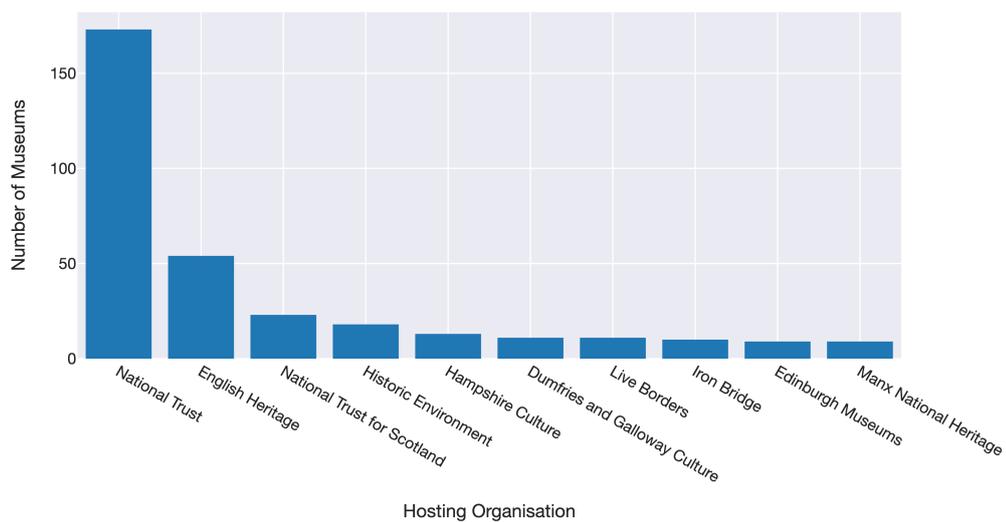


Figure 4.42: Top 10 most common umbrella organisations.

4.5.2 Inequality in Access to Collections Information

There are a number of different ways that museums showcase their collections online. Predominantly, academic papers have focused on digitised collections and searchable databases that are made available through a ‘Search’ or ‘Explore the collections’ page of a museum’s websites (Figure 4.43). However, this requires advanced digital infrastructure and therefore only makes up a tiny fraction of what museums offer online.¹¹¹

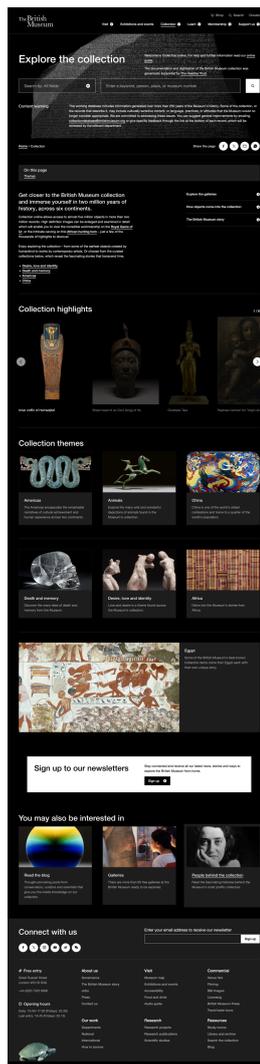


Figure 4.43: Sophisticated searchable collections interface on the British Museum’s website.

¹¹¹A significantly higher proportion of museums have digital catalogues and databased available internally, however, many do not make these available to the public due to concerns over copyright and sensitive or offensive material (Miles 2023; University of Reading 2025). In this thesis, the focus will remain on what is accessible to individuals outside of a given organisation.

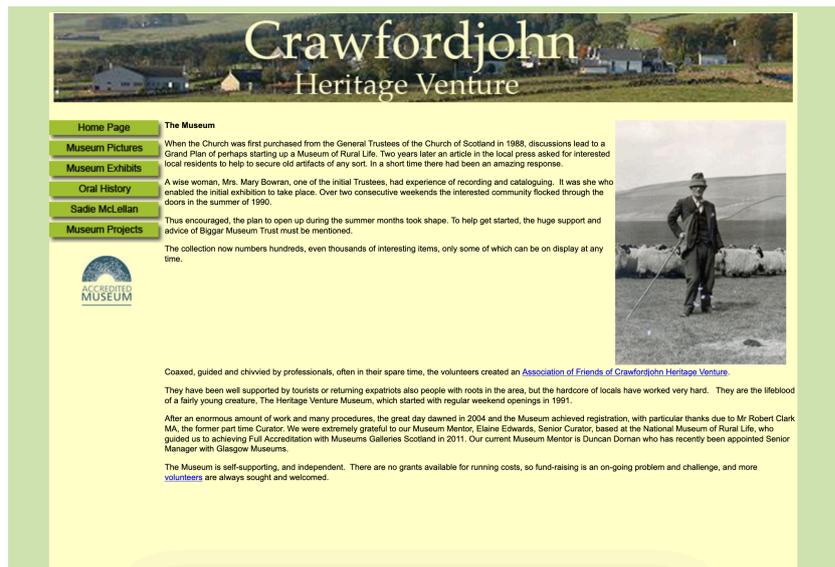


Figure 4.44: The Crawfordjohn Heritage Venture website, representing an average page for a UK museum, with a dedicated collections page.

While this opens up the collections for both curious visitors and academic research, an overview can inspire a visit, and those with fewer technological resources are able to highlight a small number of objects in a carefully curated narrative. As such, I used a broad definition of collections information – spanning PDFs, blog posts, or even just a line about what is in the museum on a local authority website. Adopting the perspective of an enthusiast or research, the guiding principle behind this decision was: if someone was looking for a particular object, would a user know whether this collection was relevant to their search?

Even using this generous categorisation, only 75% of museums had any information on their collections available online at all. A third of these websites had a more substantial amount of information available, with a dedicated page to collections (one such example is shown in Figure 4.44). However, some areas are much better represented online than others. Figure 4.45 shows how the percentage of museums with collections information available varies across the country.

Welsh collections are particularly poorly represented online, while museums in the Southeast of England are well represented. Museums in the Midlands and Northeast of England also have lower levels of accessibility than their southern counterparts. However, it is not universal, with local authorities with high accessibility rates neighbouring areas where no museum collections information is available at all. This is in part due to the policies of different local authorities and whether they provide digital support – even for entirely independent museums. This kind of support has bolstered the availability of collections rates, especially

4.5.2. Inequality in Access to Collections Information

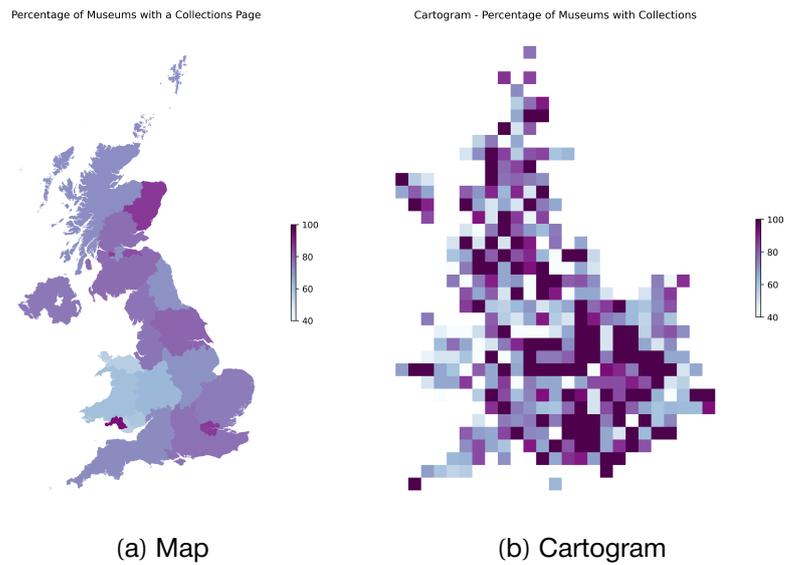


Figure 4.45: Percentage of museums with collections information available online shown per local authority.

in Scotland.

Availability of Collections Information, Separated by Museum Subject

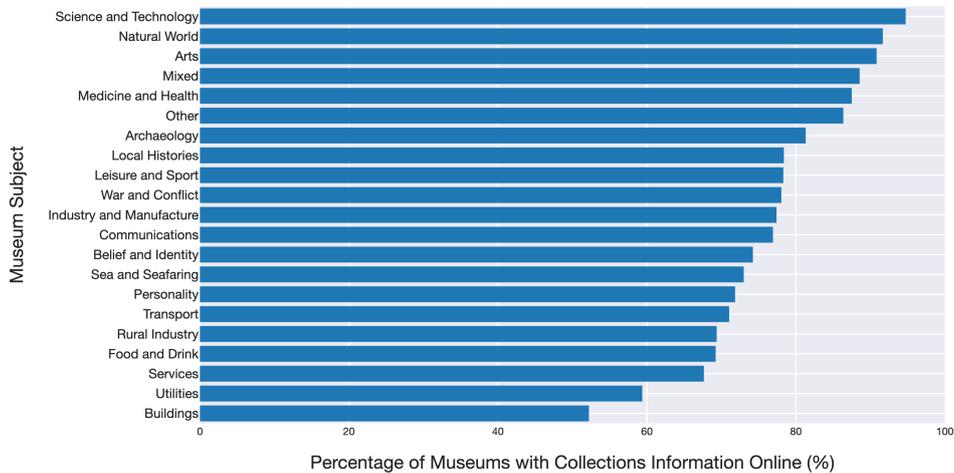


Figure 4.46: Bar chart to show what percent of museums – separated by the subject of their collections – has collections information available online.

This inequality across the sector was further explored by looking at what types of collections are most likely to be available online (Figure 4.46). Museums with a collection based around science are most likely to have information about their collections online – 95% of them have at least some collections information avail-

able. This is likely the culmination of a number of different factors: the openness of staff to new technologies (Vicente et al. 2012); organisational priorities; and the UK funding landscape (Bell 2008; DeWitt et al. 2019).¹¹² An emphasis on the role they play in education – and specifically encouraging young people towards careers in the sciences, technology, engineering, and maths – has been encouraged and partially funded by government initiatives (Parliamentary Office of Science and Technology 2011). Science museums had a key role of the diversification of educational resources (Morgan et al. 2016), and have therefore both made a concerted effort, and have been afforded the resources, to make their collections as accessible online as possible.

In contrast, buildings have the lowest proportion of information available about their collections. This may be a direct result of the fact that many museums centred around buildings – or architectural shells – do not necessarily also have large collections of objects. This is not true of every site but could have contributed to their comparatively low levels of online availability. This same logic may also explain why museums with collections based on ‘Utilities’ and ‘Food and Drink’ are also poorly represented online.

The same is not true however, for ‘Rural Industry’ or ‘Transport’ museums. These types of museums are often in areas with industrial legacies, which is important context in understanding why their collections are under-represented online. Within the UK, these areas are often economically deprived – having the highest deprivation index in the Mapping Museums dataset (Poulovassilis et al. 2021; Ballatore and Candlin 2023). Unlike their urban counterparts, many rural industrial areas have not seen the same type of regeneration projects and investment which has revitalised metropolitan centres (Tallon, 2010, 210-211).

4.5.3 How Are Museums Running Their Websites?

There was a large range of approaches that museums took to build and get their websites online. This spanned highly customisable tools such as Drupal to blogger, and in one case, Microsoft Word.¹¹³ However, metadata fields for attribution, authorship, or hosting platform – such as Wix, or WordPress – are not universal.

¹¹²A disproportionate number of the studies referenced in the literature review were conducted in collaboration with science museums, and they have proven sites of innovation in the sector. Although not discussed in this thesis, this encompasses the development cutting-edge measures of on-site visitor engagement using computer vision techniques (Heath et al. 2005; Block et al. 2015; Brown Jarreau et al. 2019; Shaby et al. 2019).

¹¹³Although it is often not recommended, due to the severe limitations it puts on the page, it is entirely possible to design and implement a website using Microsoft Word. A guide has been created by the University of Delaware and the University of Kent, although as both guides are designed for students they require an alternative web server to be used (University of Delaware

Instead, by utilising a combination of the ‘generator’ field and a search of the html list of common third-party companies, it was possible to successfully identify the host platform for 51.5% of websites which represented over 1,500 museum websites (Figure 4.47). This is lower than anticipated, but usefully is representative of the wider population in terms of size and distribution between different types of organisations.¹¹⁴

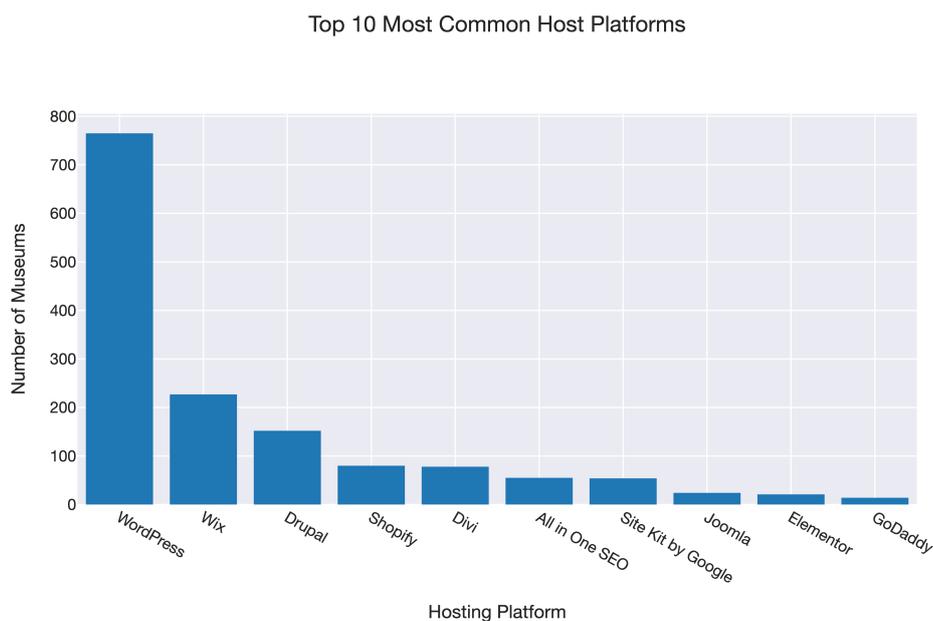


Figure 4.47: Top 10 hosting platforms.

Of these, 23.2% of museums used WordPress to create their website. For services provided by third-party companies like WordPress, the cost is minimal, they require minimal technological expertise to set up, and there is a wide variety of supporting documentation and a large online community. It is therefore unsurprising that 65.8% of WordPress users are small organisations, while small museums account for just 54% of the total dataset. The prevalence of a single company – especially for smaller organisations – has interesting ramifications of the adoption of technology.

The use of ‘AI’ has been widely discussed in the museum sector and encompasses a broad range of technologies and approaches but is increasingly used as a shorthand to describe generative – and black box – models used for text and

2004; Kent Student Multimedia Studio 2021). This can be done from a personal computer given sufficient expertise with the Linux command line and the registry of a domain name.

¹¹⁴The success rate could be significantly improved by expanding the number of companies that are explicitly searched for in the html, however, as each platform is used by fewer museums, this requires increasing amounts of manual close reading.

image generation such as Dall-E, Sora, and ChatGPT. Yet, despite the hesitancy and caution around AI expressed at museum conferences, many of these website platforms already have integrated AI features, from embedded text and image generation, to chatbots (Wix 2025a; WordPress 2025a). In much the same way that many of these features are now embedded in word processing tools and teleconferencing software, these website building platforms are likely to be the main way most small organisations – without in-house technical expertise – first encounter generative AI tools.

While on the one hand this takes a step towards democratising the use of these new technologies, it poses a number of ethical and practical issues for the sector. The ecological and humanitarian impact of training these models are widely documented (Bashir et al. 2024; Muldoon et al. 2024). However, opting-out of some services – including generative AI tools – is often not possible with all third-party companies (Anonymous 2023; Chayka 2024).¹¹⁵ In addition, the integration is such that many users – both visitors and museums – may not be entirely aware of when they are using AI. Considering the role museums play in society and as a trusted forum for public discourse, the introduction of potential biases to the visitor experience is particularly pertinent.

4.5.4 The Online Collections Visitor Experience

The pitfalls around AI tools for research were discussed at length in the methodology. They have however been used here as a form of visual summary, and computer vision was used to analyse and group screenshots of museum websites. This was first run on the website homepages (Figure 4.48), and then again on the museums' collection pages where they were available (Figure 4.49).¹¹⁶

The homepages fell into two broad clusters – represented in Figure 4.48 – which were text-based (pink) and image-based (purple). Smaller museums were more likely to fall into the text-based categories and adopt typography and layouts that are reminiscent of early web-design. A close examination of the outliers revealed that some of these sites had been active since the early 2000s and had merely had

¹¹⁵The methodology covers the complexities of terms of service more broadly (p. 104), which is both a precedent and parallel for users' lack of agency regarding the tools and services they use. The large companies and corporations that form the most common internet providers do not allow a partial agreement, as the WordPress terms and conditions state, 'If you don't agree to these Terms, don't use our services' (WordPress 2022; WordPress 2025c).

¹¹⁶Notably, Figures 4.48 and 4.49 do not have labelled axes. These figures are both two-dimensional representations of high dimensional data in which a number of compromises are made to retain important information – such as the relationships between the data points (McInnes et al. 2018). However, they are ultimately abstractions, and the axes do not have any inherent or human-comprehensible meaning (see Section 3.11).

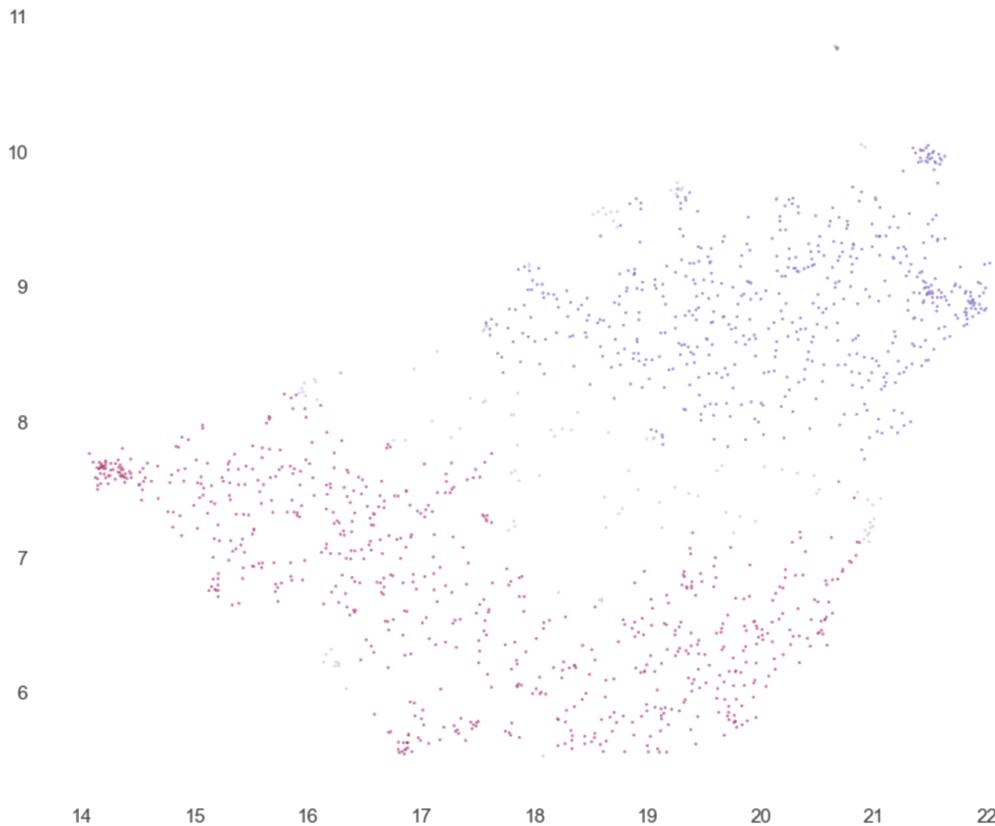


Figure 4.48: Clustering of screenshots of museums' home pages using CLIP. Text-based sites (cluster 1) are represented in pink and image-based sites (cluster 2) are represented in purple.

the text updated. Figure 4.44 was chosen to showcase how these older websites can often be reused and updated. Updating a page requires less expertise than setting up the website – and is often done by a different individual – which in some cases leads to a disjointed experience.

In part due to the number of different methods used to create the text-based webpages, there was significantly more variation than within the image-based sites, which can be seen in the broader spread of the pink cluster.

This is likely the result of image-based sites often relying on the templates of third-party companies which are seen in the smaller sub-clusters visible in the figure. Despite looking more streamlined, these image-based sites do not require extensive technological expertise to implement. Now that the URLs have been gathered, it would be an interesting avenue for future research to collect the html and screenshots of museum websites over the past two decades – via an archive such as the Wayback Machine – to explore how museum websites have changed over the years (Sherratt et al. 2023). While only a small proportion of website will

have been archived, it would provide an insight into changing practices in the sector and web design more broadly.

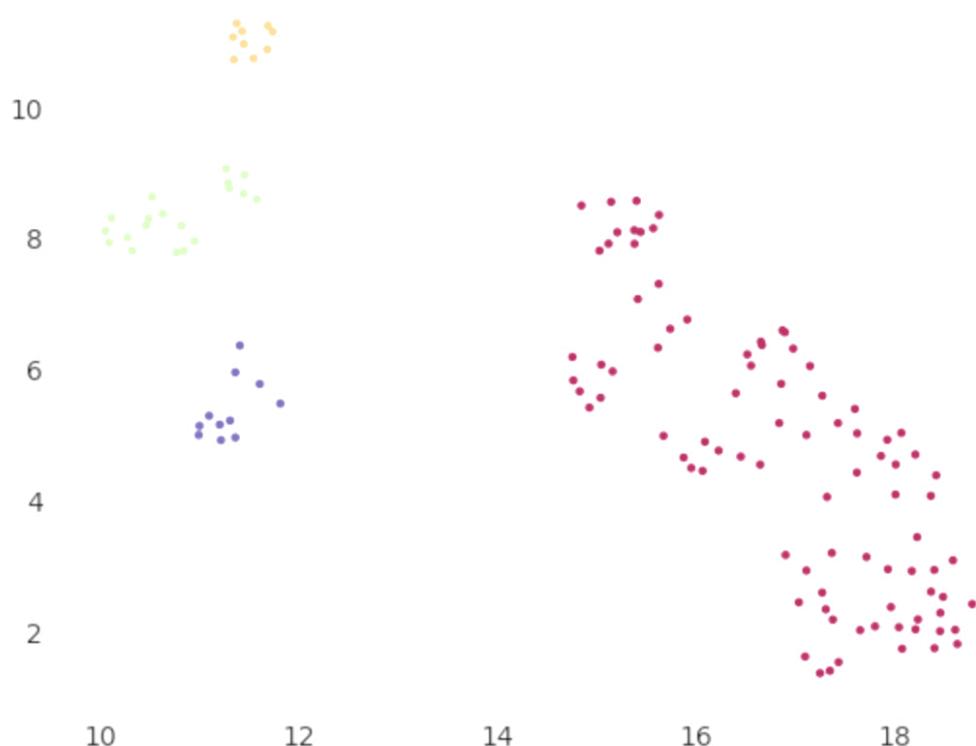


Figure 4.49: Clustering of screenshots of museums' collection pages using CLIP.

The use of computer vision to categorise the collections pages was perhaps more informative than when used on the homepages. Here, four distinct clusters emerged (Figure 4.49): one represents images integrated in text blocks (represented in purple); another is characterised by single images (yellow); one cluster has large headers and footers (the lime green cluster in the top left), and the last and most prevalent category, consists of grids of images (pink).

Once again, small museums were disproportionately likely to adopt a text-based approach, while the very largest museums were most likely to have a single image dominate the front-page to their collections (Figure 4.50). In multiple cases, this single image would be an automatically playing video, or a slideshow, and users can either click through a conventional menu or scroll to see more options – a popular feature inspired by social media. This layout has been adopted by most huge and large museums in the UK, including the British Museum, V&A, and Royal Collections Trust. Interestingly, in the wider marketing literature autoplay has been found to significantly increases the amount of time spent on a given site (Schaffner et al. 2025). Removing the play button significantly increases user

retention (Siroker and Koomen, 2013, 43), and videos in particular are much more effective at getting users to click than texts or images (Moran et al., 2019, 533). Considering that large institutions are able to hire professional designers for their websites, it is perhaps unsurprising that techniques developed in other sectors have been adapted for their needs.

Such techniques are detrimental to user autonomy, and so called ‘manipulative interfaces’ have been heavily criticised (Schaffner et al. 2025). However, the extent to which they have been applied in museum interfaces is minor and arguably, when these techniques are divorced from a cross-site advertising ecosystem, has fewer adverse effects on users. However, these autoplay videos do still pose a challenge to accessibility, inhibit the legibility of screen readers, is bandwidth intensive, and can be confusing (Bureau of Internet Accessibility 2020; Accessible Web 2025). It is notable that between November 2024 and June 2025, a number of these videos have been replaced with still images.

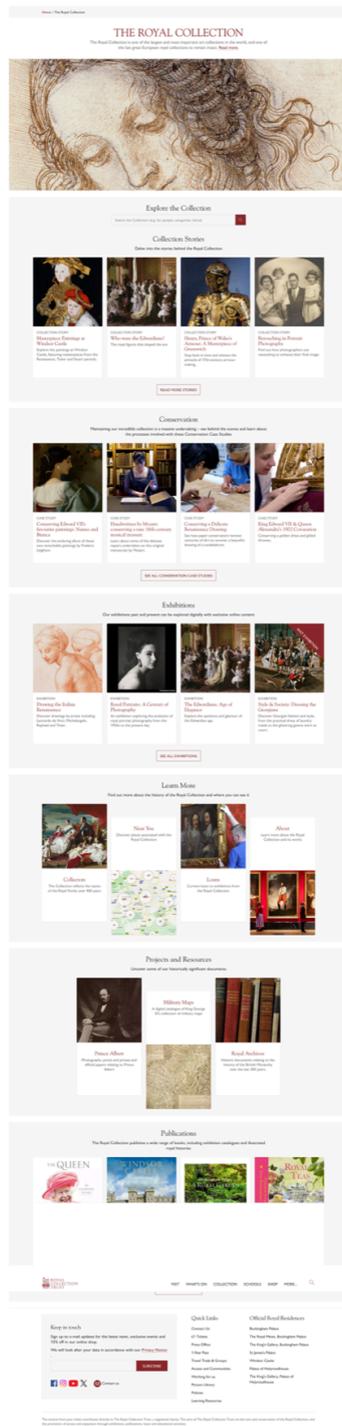
The sites with large headers and footers, while a small group, are predominantly local authority websites. In these cases, a lot of information – including bin days, contact details, and other services – are all provided in the menus and footers. As museums information is often scant on local authority websites, usually consisting of a brief description and open times, this can be visually overwhelmed by the other services and options.

However, there is more to say about the final cluster, which represents sites that have a tiles pattern of images. The vast majority of museum collection pages have opted for a similar format, presenting photographs of objects in a grid pattern of square images. This belies the diversity of buildings and approaches in the sector that span living museums, archives, and galleries, which is not reflected in museums’ digital offerings.

While there has been experimentation with virtual galleries and new innovative ways of presenting collections, the vast majority of online experience look like Figure 4.51. This example, is the Williamson Museums and Art Gallery’s collection page. The site, run on WordPress and utilising the lightbox plugin, is more typical of a UK collections website than the advanced databased management tools used by large museums. As only a small number of artworks are included on the site, they were able to adapt these tools to showcase their collection without relying on a database.

However, in adapting a template not intended for museums’ particular use case, a number of compromises are made that can have unintended consequences on how audiences perceive objects in cultural heritage collections. Most of the tem-

4.5.4. The Online Collections Visitor Experience



Visible on opening the website in a tablet, laptop, or PC.

Accessible through scrolling.

Figure 4.50: Collections interface on the Royal Collection Trust. A second example of a similar interface, this time from the British Museum, is depicted in Figure 4.43.

plates that centre images on third-party platforms such as Wix and WordPress are

4.5.4. The Online Collections Visitor Experience

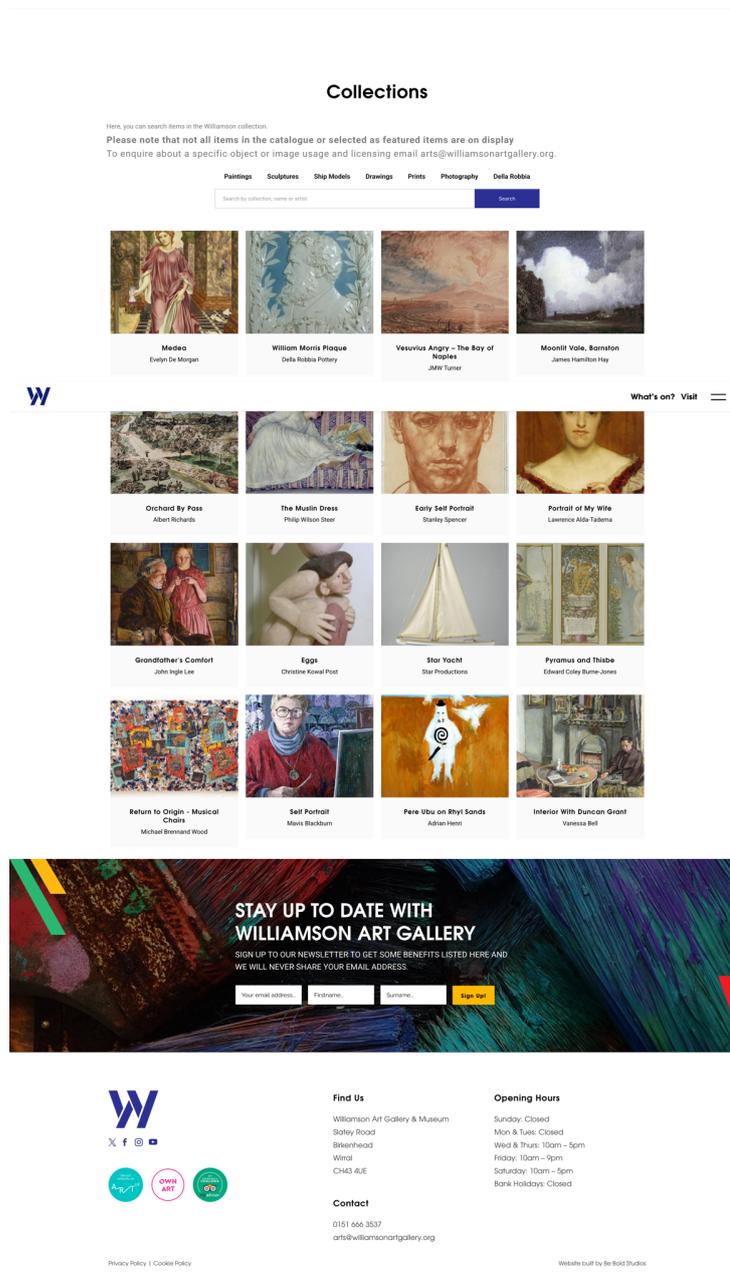


Figure 4.51: Collections interface on the Williamson Museum and Art Gallery website.

designed to showcase as portfolios. As such, they automatically crop thumbnails to create a neat grid-based layout. However, the diversity of objects in museums is such that this can lead to unexpected results, with key elements of the image being cut out of frame. In Figure 4.51 the thumbnail of 'Eggs' by Christine Kowal Post is identifiable on the collections page, but this representation is rather different from the one seen when clicking on the object's page (Figure 4.52). Due to aspect ratio of the photograph used, the vast majority of sculpture lies out of the



Figure 4.52: *Eggs*, by Christine Kowal Post. Image taken from the object's page on the Williamson Museum and Art Gallery website.

frame of the thumbnail.¹¹⁷

In this particular case, the thumbnail image is taken from the centre. However, when uploading a number of images at a time, many platforms now enable automated cropping. Here AI, specifically object and face detection, is used to automatically crop uploaded images and videos. This is already in place across Meta and Adobe platforms, and this is increasingly common across other platforms, in part because there is a substantial body of evidence that shows social media posts with images of people's face have more likes, and advertisements with faces get more clicks (Sajjacholapunt and Ball 2014; Xiao and Ding 2014).

But their implementation is not without controversy. In 2020, the cropping al-

¹¹⁷While the landing pages of many collection pages feature such cropping (including both the British Museum and Royal collections trust, Figures 4.43 and 4.50), this is exclusively used for the thumbnail images of curated narratives and blogs. Where custom solutions have been created for museums, collections items are not cropped and even have the frame included in the image. For an example of this, see the V&A's search the collection page.

gorithm that Twitter released was discontinued when it was discovered it prioritised white faces over black ones (Hern 2020). While this is not currently in use, this is a simple example to highlight how seeming innocuous implementations of AI, if not extensively tested, can have adverse consequences.

Therefore, while the use of AI in museums is thoroughly debated in conferences, it is notable that the most likely use case for AI implementation in the sector will be through third-party companies. The types of museums who are most likely to turn to these off the shelf products, are those with the fewest resources and technical expertise to navigate the AI tools which will likely become the default option on these platforms. With a limited ability to opt out, and not control over which models are used or the training datasets, the introduction of intended bias to the experience of UK culture collections is of concern.

4.5.5 Summary of Website Study

This study has highlighted that, much like on social media, on museum websites commercially motivated tools and interfaces are increasingly acting as mediators between museums and their audiences.

- The majority of museums rely on a larger organisation to host their webpage, and local authorities widely support museums digitally.
- A quarter of museums have no information available about their collections online.
- Existing inequality in the sector is evident in who has information available online, with smaller museums less likely to have collections information available.
- Museums rely extensively on website providers such as WordPress and Wix to host both their websites and information about their collections.
- The result is a remarkable homogeneity between museum websites that flattens the diversity of physical sites and collections within the sector.
- These providers are also likely to facilitate most museums first use of new technologies, such as AI tools.

This provides a useful context for the social media analysis conducted in the previous studies; however, it only represents a cursory step towards a full analysis of websites in the sector. Further work exploring museums' collections databases,

how they've changed over time, and the text on these sites would provide a fruitful line of future inquiry.

4.6 Quantitative Results Summary

Throughout both the social media and website studies, museums' reliance on private companies for digital infrastructure repeatedly re-emerged. Whether it is in the role of recommendation algorithms, terms of service, or the implementation of AI tools, these corporate entities and the services they provide are increasingly becoming mediators between museums and their audiences. They shape museums' digital strategies in a number of ways: they dictate how and to what extent museums' posts are disseminated; the audience experience on both social media and websites; while the tools they release shape what museums – especially those with limited resources – are capable of producing online. The lack of digital expertise in the sector, and the expense of domain-specific software, has led to most museums adopting publishing solutions that practitioners neither fully understand or control.

This finding has only emerged due to the scope of the museums included in this thesis, which are more representative of the wider sector than the focus of previous literature on accredited institutions. Widening the types of organisations included has repeatedly highlighted just how low levels of interactions with museums online are. Most starkly, it has highlighted the gap between the highest performing museums and the vast majority of the sector. For the most part, although not always, these high performers are museums with more resources, and correlate with the types of museums – large and accredited – who are best represented in the existing literature, and sector-wide discussion. It is therefore unsurprising that digital capability in the sector has likely been overestimated.

Chapter 5

Interviews

The interviews aim to explore why museums behave the way they do online and identify organisations' primary goals of using social media and websites. Combined with the quantitative analysis, this will help identify achievable and relevant strategies help museums in the future. As such, this section aims to:

- Identify the key organisational goals and how they impact digital strategies.
- Assess how museums evaluate these strategies and explore how this feedback is utilised.
- Further explore the discrepancy between the amount museums post about events and the levels of engagement this receives.
- Investigate why transport posts are so popular.
- Explore how museums have been discussing the monetisation of online audiences.
- Investigate to what extent the algorithmic mediation has been felt by museum practitioners
- Further explore why the promise of social media – that it will reach younger and more diverse audiences – has not materialised in the data

As the interviews were conducted concurrently with the quantitative data analysis, they were able to nuance the findings of the quantitative studies, while also opening new avenues of inquiry. This section therefore draws heavily on the previous findings and teases out key themes from the overall body of research, acting in part as a summary and discussion.

5.1 Important Context

This research was conducted during a period of rapid change in the social media landscape. Between 2018 and 2020, the use of the platform TikTok skyrocketed in Europe and the US (Schellewald 2023; Herman 2019). As a result, many new features were released with the aim of replicating TikTok's success by centring short video content. Examples include Instagram reels, which were released in August of 2020, and YouTube shorts which launched later the same year. Continuing to follow events chronologically, in 2021 Facebook's parent company rebranded itself as Meta in part to better incorporate the new research done on VR and AI, but also in a bid to distance itself from multiple scandals around misinformation on the platform (Thomas 2021). Then, one month later in October of 2021, Elon Musk bought Twitter after a prolonged dispute (Zahn 2022). There was a decline in active users on the platform, and as the platform's moderation policy was relaxed many companies withdrew their advertisements (Reilly and Duffy 2023). The number of users on the site and its estimated value have wildly fluctuated during Musk's tenure (Buncombe 2025; MJ and Soni 2025), however, it should be noted that the interviews in the following section were conducted before Elon Musk performed a fascist salute at a rally in Washington, D.C. (Connolly 2025). At the time of writing, July of 2025, no participants or their organisations have an active presence on Musk's platform.

These developments had left participants struggling to keep up with the latest changes, and four participants – entirely unprompted – expressed feeling overwhelmed. These particular interviews coincided with the release of news stories about safeguarding on platforms, which has been an ongoing concern (Wending 2023; Hickey et al. 2025; Milmo 2025). As such, both individual and organisational attitudes to platforms have changed significantly over the last few years, as P5 summarised:

We're having to re-get to grips with Facebook and Instagram because meta is now a thing... all this drama happening with Elon Musk and Twitter, like you constantly have to try and stay abreast of the politics of everything as well, because... people might be dropping off Twitter, people might be dropping off Instagram, and that means your audience is constantly changing. (P5)

Considering this shifting landscape and the changing public opinion of different social media platforms, it is necessary to remember that these interviews were

conducted at a specific moment in time. Where necessary, participants answers have been contextualised with information related to their specific comments, while more general trends have been compared to findings from the earlier studies and wider body of literature of museums' digital initiatives.

The chapter is roughly split into two parts. The first explores museums' motivations and digital strategies at a high level, and asks the barriers they might face. While the last section builds directly the findings of the Population Study to explore why some topics generate more engagement.

5.2 Motivations for Using Social Media

5.2.1 Ticket Sales

Echoing the results of both the population and websites studies, there was a remarkable homogeneity in the way most participants approached posting online, with the majority using their accounts for advertising tickets. As P2 noted:

It's just a reminder – we're still here! Especially over the winter holidays, 'we're still open', 'please come and see us', that kind of thing. It's particularly to get bums on seats. (P2)

Visitor number and ticket sales was the most prevalent motivation for developing websites or a social media presence amongst participants, explaining the results of the topic – which found that the most widely posted topics were focused on 'opening' and 'closing', 'ticket sales' and 'shops' (p. 172). This was explicitly expressed by P11 and P8 who only used social media 'to support the sales of [their] events' (P8), and P4 – the trustee of a small museum – even expressed a hesitance to improve their online offering, less that result in fewer in-person visitors.

So what we've got to work out... is how much we put on the website, because you don't want the museum to be a virtual museum, and for people to just use the website and not come in... The website, I think, has probably got to be the teaser that gets them in here, rather than it being to the complete answer to their question. (P4)

Posting about upcoming events and exhibitions was irregularly implied to be a basic duty, with participants stating that they 'always', 'must', or 'have to' post this type of programming content. P7 expressed this sentiment more explicitly:

I'm always determined to press on with putting out events and things because I think it – whether or not people engage with it – I still think it's important to say what's going on. I must... [otherwise] it's quite hard to actually find out about events... whether or not they want to come, there's a different matter, but at least you can let them know that things are happening, which I think is important. (P7)

There was a repeated acknowledgement that these posts about events would not necessarily have high levels of engagement. However, there was a belief amongst a minority of participants that while they do not perform well on social media, they see the impact in ticket sales. P8 noted that when they started advertising on social media, they 'do see an increase in users on our website' (P8). This statement remains the only evidence identified that social media has an impact on ticket sales that has emerged from this research.

It is ultimately, very difficult to parse out the different impacts of interlinked variables. Notably, P8 highlighted that only 10% of the website visits came from links in their social media posts, and they also conducted other forms of advertising alongside their social media campaign.¹¹⁸ Therefore, it is not entirely clear whether the increase in website visits can be attributed to their social media posting.

A number of other participants expressed doubt that posts about programming increases visitor numbers.

So yeah, I mean really, we are just trying to do it to kind of just keep a bit of a presence [on social media]. I don't think that it translates into visitor numbers as such, but I just I'm keen to kind of show that we are doing lots of things as a museum. (P7)

Later in the interview, P7 recalled an anecdote from before the pandemic, which further highlights that online audiences do not necessarily translate in on-site visitors.

¹¹⁸Measuring the impact of social media on website visits is itself relatively inexact. P14 had tried to measure the 'conversion rate' between social media views and ticket sales as part of a short-term project and noted that Google Analytics was unlikely to be entirely accurate. Google Analytics reports the 'source' of online visitors, this is the website that the visitor was on directly before coming to your website. It can be a search engine, other website, or social media platform. However, if a person sees a social media post and then searches for the website using Google, the source would not be tagged as 'search engine', not 'social media', even though social media marketing had had an effect. Therefore, this lack of evidence for social media's impact on visitor numbers does not suggest that there is no impact at all, but merely highlights just how difficult it can be to isolate the impact of one of the many variables contributing to ticket sales.

I think it was around the week between Christmas in 2019, we put out a post just to say we were having a games day... over two and a half thousand people had seen it, which is obviously a lot more than we might normally get. And then I was in a bit of a panic thinking ‘Goodness, are we going to be inundated?’, we were only expecting a few people. But it certainly didn’t translate into hundreds of people.
(P7)

This experience is indicative of a well-known participation inequality among internet communities (Hill et al. 1992). This was succinctly described by Jakob Nielsen as the 90-9-1% rule: for every 100 people in an online community, 10 will interact with a resource – liking, commenting, etc. – while 1 will create content (Nielsen 2006; Parvanta et al. 2013). Meanwhile, 90% of users will only watch, or ‘lurk’ to adopt internet parlance (Arthur 2006).¹¹⁹ Therefore, for every hundred people who see a museums’ social media post, only a small proportion will click a link.¹²⁰ The number of users who will then go on to purchase something is even lower, making it particularly difficult to predict or understand the key contributing factors (Lee et al. 2012; Lu et al. 2017). If the average museum Facebook post receives 9 likes – it would be reasonable to assume that this would result in less than one person going to the website (p. 148). A smaller fraction still would purchase a ticket or organise a visit. Therefore, if we work on this rough conversion ratio, it is only extremely high performing posts that would be result in a significant – or any at all – rise in visitor numbers. It is unsurprising then that multiple participants were sceptical that a social media presence would improve visitor numbers, as one participant commented, ‘you wouldn’t really get someone through the door specifically because of a post’ (P9).

Yet despite the well-founded scepticism around the impact of posts on ticket sales, there appears to be an important distinction between posting about tickets – which is particularly unsuccessful – compared to posting about the collections. As P7 highlights:

¹¹⁹It is this trend is also visible in the distribution of views, likes, and shared in the Population Study, where an average Facebook post has 9 likes, and 1 share (148). There is of course some variance across platforms and museum types, but the ratio of likes to shares and comments remains relatively constant.

¹²⁰Click-through rates do vary, but are primarily a metric used for advertisements (Facebook 2025). The average click-through rate on an advert tends to lie between 0.2 and 0.7% (Social Status 2025). However, this not directly comparable to museums posts, which are primarily shown to the followers of museum accounts. In theory, the click-through rate for posts should therefore be slightly higher, which is why in the following calculation I have been generous at an estimate of 1%, less likely than likes but more common than commenting.

[What works well is] museum artifacts or museum collection photos, they seem to generally be the winners in terms of getting a lot more recognition... [I post most about] our latest events, our talks, our art workshops, our family events, evening event, you know, that sort of thing. Generally, that's what I use it most for, but I know that actually what gets the most recognition is the other stuff. (P7)

Yet, P8 explained that they were able to utilise the success of the collections content to increase the size of audiences seeing their posts about programming at the museum.

So for example, last year, one of the things we introduced was those weekly insights into the archive, which tend to be really popular. They got the biggest reach on our platform... and that's definitely helping us gain a lot of reach on socials and then obviously that impacts everything else as well. (P8)

Notably one of the most successful social media managers amongst the participants, P12, was able to directly recall examples of on-site visitors having been inspired to come by a post. Yet the posts that inspired these visits weren't about what was happening at the museum, but rather highlights from the archives.

And we get people now come into the museum and are, we'll say things like, you know, I saw that 'On this day',¹²¹ I saw that social media post, I saw this, I saw that. It was really interesting to want more information and stuff. (P12)

It appears then that the widespread focus on programming – events, exhibitions, and tickets – has likely negatively impacted the size of museums online audiences. P5 had strongly criticised the common approach to both programming and social media, and instead, proposed a more sophisticated way to incorporate social media into the museum.

I would refer to something I do, that is like backwards programming. I will say, okay, well, traditionally, when we have a half term offer on, you

¹²¹This refers to a group of hashtags used across both Twitter – and occasionally Facebook – that highlight events that occurred on a particular date. 'On this day' (#ONTD or #OTD), or 'Today in History' (#TDIH), are used to highlight interesting historical events, and is a format used both widely in and outside of the museum sector (Hudson 2017; Shelton and Cheng 2017).

have these different kinds of people, these different kinds of audience groups that kind of want to visit, you need to be designing something for them, because there's no point in designing something and then trying to crowbar an audience into it. What you really need to do is recognize who are the people that want to visit us at this time and what can we do as a museum to best case to them so that the people we know are going to visit have the best possible experience. (P5)

This 'backwards programming' centres the visitor experience and uses social media posts to highlight what within the museum visitors might enjoy. In this way, the focus is moved away from making audiences aware of an event, and instead aims to showcase what they might see and experience.¹²²

In an inverse to most museums' use of social media to publicise events, P5 highlighted that social media is an invaluable tool for helping shape events programming.

There's no point in creating something when you don't already have the people to engage with it. There's no point in crowbarring an audience into a thing. You need to create the thing knowing that you've got an audience there. What you really need to do is recognize who are the people that want to visit us at this time and ask what we can do as a museum to show them so that they will have the best possible experience. Because that's how you then get more people to visit. (P5)

Here communication teams are able to use the constant feedback provided by social media to provide insights into what will be popular on-site. As a consequence, the communications team work across departments, providing data and feedback on initiatives throughout the museum.

5.2.2 Education

Considering the nuance of the reflection provided by both P5 and P12 – both of whom managed high performing social media accounts – it is significant that neither prioritised ticket sales nor increasing visitor numbers. In a stark contrast to the focus on ticket sales at other museums, their focus was on educating the public.

¹²²This emphasis on getting viewers to inhabit a new imagined reality, one in which they have made a trip or purchase, is in fact a core tenant of advertising (Petrova and Cialdini 2008).

I always feel like as a museum service, you're educating people and giving them information and knowledge and teaching them things, whether or not they rock into the building physically... our directives and objectives have always been, are we educating people? Are we teaching them? And the website and social media is like a huge yes for us. (P12)

[Social media is] really good for our aims as an educational charity. It doesn't necessarily matter to us if 300,000 people watch a video. Those 300,000 people don't have to necessarily then go and buy a ticket, but those 300,000 people might know a little bit more about the [region], a little bit more about what we stand for, about our story, about our messaging, and that's just as important really. (P5)

To some extent, this likely allows them to veer further away from the focus on programming, and in turn enable them to focus on the kinds of content that performs better on social media.

While it has worked well for participants 5 and 12, many museums do not have the necessary resources to invest in projects which do not tangibly improve ticket sales, and it is generally the smaller and less well funded museums that focus on programming. Yet there is a certain irony to the fact that by not focusing on events, P5 and P12 appear to have achieved a larger increase in visitor numbers than those museums who dogmatically stick to posting about programming.

5.3 Covid-19

5.3.1 Collections vs. Programming Content

Yet, as museum sites closed during the national lockdowns of 2020, museums' focus on events momentarily waned. Unable to sell tickets, many participants found themselves similarly orientating their communication strategies around outreach and education.

We had a Facebook page and we used to post occasionally – perhaps the if there's a working party or something happened. When the museum shut because of Covid... we decided to start doing a weekly exhibit. That's been going on for about three years now. (P10)

The weekly exhibit was markedly different from P10's usual posts, which generally focused on events and providing notices for general information, such as shifting opening times. However, with sites closed, they found that their reduced responsibilities elsewhere gave them time to experiment with new types of content. P12, highlighted that site closures enabled them to focus on social media in a way that was simply not possible while the sites were open.

I mean, the building was shut, but it allowed us to just focus completely on our online presence. So the result was our already really really good subscriber numbers at the time, just went up and up and up. (P12)

This account of the pandemic aligns well with the results of topic modelling, which saw an increased focus on 'paintings' and 'collections' in May of 2020 (pp. 171, 275). Considering the generally low levels of engagement seen with posts about programming, this shift towards posts about collections may have contributed to the increased levels of engagement.

However, the quantitative results would suggest that this shift to collections content was not ubiquitous. In the Population Study, the topics about programming were still widely used throughout 2020 and 2021, and a study of the same period of Kidd et al. found that 73% of tweets were labelled as having a 'promotional' tone (Kidd et al., 2022, 24). This is perhaps unsurprising considering that some managers did not see their workload change. The Cultural Participation Monitor final report notes many 'saw no reduction to workload through furlough' (Walmsley et al., 2022, 35).

The interviews would suggest that it was predominantly museums with existing digital resources and expertise that were able to best capitalise on the extra time that the pandemic afforded them.

The pandemic was weird in many ways, but it was good for us. And I don't mean that to sound really bad, but it was good for us because we were already doing fantastically well with our social media. But when we all started working from home... it was really easy for us to just continue doing more jobs as normally. It didn't matter. (P12)

There's was no one in, we've not got any communications going on internally, everyone's on furlough... so, we had a lot more time on our hands... We had all this extra time to invest in creating kind of a digital community that celebrates our kind of specific arts heritage organisation. (P5)

This reinforces the findings from the quantitative research that suggests that larger museums were able to adapt to the pandemic faster than smaller organisations (p. 129). The speed of their response appears to have been enabled by the reuse of pre-existing digital resources. P1 highlighted that the fact they already had a strong online presence and created digital content around their exhibitions in 2019, they were better prepared when national lockdowns were introduced.

...because we already operated like this [with digital content designed for each exhibition], it meant that we could carry on with the physical exhibit that we had put together and release a digital version. (P1)

This was not possible for the majority of participants. Smaller organisations – especially those that were volunteer run – were forced to close entirely, and did not have the expertise or volunteers to create online resources. As P3 highlighted:

Immediately we knew we were going to be in trouble because we normally just run from Easter to September, and it just put the kibosh on that season completely. (P3)

The museums of both P3 and P4 struggled throughout the various lockdowns as their older volunteer base were uncomfortable returning to the site before vaccinations were widely available. However, there was no reprieve post-pandemic, and visitor numbers have failed to return to levels seen in 2019 (Arts Council England and PS Research 2025; Ware 2025).¹²³ As P3 said, ‘it’s just not picked up again’ (P3).

In addition, for those who had thrived during the lockdowns, the reopening of sites, meant that the responsibilities that had been alleviated by Covid-19 returned. As a consequence, P2 had noted that use of social media platforms had declined rapidly.

I think social [media] really came into its own with Covid, obviously, but it's completely fallen off now. (P2)

¹²³The lower-than-expected number of annual visitors after the pandemic is a large issue for the sector that has been well-documented (Arts Council England and PS Research 2025; Ware 2025). It is thought that the ‘cost of living crisis’ in the UK – where inflation has seen the cost of living rise and wages stagnate – has contributed to people choosing to stay at home (Francis-Devine et al. 2024; Harari et al. 2024). While this is important context that will be raised again in the discussion, the details are outside of the scope of this thesis which will remain focused on digital visitors.

Many participants expressed that they would like to continue the activities and services they provided during lockdown, but this simply was not feasible with their current workload and resources. P10 expressed that they were short on time since reopening.

We've got some activity sheets and so on, which are on the website. They were created through Covid to put up some things that people could do at home... It doesn't take many resources, I suppose we want to try and increase that at some stage, but there's only so many hours in the day. (P10)

P11, expressed the fear that previously successful initiatives – such as online video discussions and guest lectures – would not find the same kind of audiences now that the world had opened back up. They were therefore hesitant to invest resources in developing a new series. Ultimately, the majority of participants expressed that they have returned to their pre-pandemic schedules and digital strategies. The one exception to this was P5, whose 'backwards programming' had in fact stemmed from their pandemic experience. They had, prior to the lockdowns, adopted the same digital strategy as many other museums, predominantly focusing on using social media to advertise events and exhibitions. Freed from their commitment to programming by the implementation of national lockdowns, they had experimented with collections-first content – highlighting the stories from the archives and adopting new social media platforms. This had transformed their way of thinking and led to a hybridisation of their digital strategy.

[During the pandemic] we weren't doing our normal thing of 'please buy this ticket'... [post reopening] we have moved back into the, 'oh also, we have a museum tour'. So, we've gone from very much 'sales with a little bit of story', to 'all story', and now we're trying to do more of both. (P5)

Yet, P5 is the outlier in the group. For most participants, the pandemic exacerbated existing inequalities in the museum sector. Many museums – especially those without dedicated digital staff – went offline entirely, while the small minority who manage to adapt – and even thrive – returned to previous habits once museums' doors reopened. It therefore seems that much of literature released in the 2020 and 2021 likely overstated the impact of the pandemic on digital practices in the sector.

5.3.2 Museums as Community Hubs

This account directly contradicts many of the statements released by ICOM that positioned museums as ‘a vital element for the communities they serve’ (ICOM 2020b). The statement casts museums ‘as incomparable places of meeting and learning for everybody’ with ‘an important role to play in repairing and strengthening the social fabric of communities’ (ICOM 2020b). This, alongside the first wave of studies conducted during the pandemic which highlighted museums as facilitators of dialogue and community hubs in a time of crisis (Samaroudi et al. 2020; Noehrer et al. 2021), prompted me to ask participants about whether the lockdowns had changed their relationships to their local communities. P5 was the only participant to agree unreservedly with the sentiments widespread in the museum community during this time. They argued that museums played an important role during the pandemic:

People did feel so isolated and cultural organisations formed a... kind of care for people because it gave them an escape. (P5)

Yet, many, while aware of the wider conversation, were hesitant to put such responsibilities on museums. P3 noted that they had ‘been using the libraries as community hubs’ but admitted that the museum did not fill this role. They argued that the museum was not equipped – with either the facilities or expertise – to offer the same kind of tangible help as local libraries which included helping people apply for bus passes, council forms, and a photo booth for government IDs. However, P3 mentioned that the site had begun operating as a warm space in 2021 as rising fuel prices meant many in the UK could not afford to heat their own homes (Francis-Devine et al. 2024). However, they had not been able to stay open over the pandemic and this was the full extent of what they were able to offer. Such concrete plans appeared to the exception amongst participants, and in general the interviews floundered on this topic.

Despite the increasing range of facilities and services museums are expected to offer, it is clear there are limits to the degree to which they can become community hubs (Woodward 2012). In 2020, the Museums Association put together a list of ways organisations could contribute during the pandemic. All of their recommendations consisted of supporting and aiding other charities focusing on mental and physical health, food, and housing (Olorunshola 2020). Previous work by Morse and Munro (2018) highlighted the ‘tension that runs through the role of museum engagement workers’ (Morse and Munro, 2018, 368). As one of their participants summarised:

We have a lot of skills that community development workers and social workers have but that are not what we are employed to do. It's very important that we are not seen by a participants as being able to offer those skills. And that is why we always work in partnership with staff from other organisations. (Regional Museum engagement worker, 2012, quoted in Morse and Munro, 2018, 368)

Museums do not necessarily have the range of equipment, staff, networks, or expertise, to be able offer the kind of support that may be found in other council-run buildings. Morse and Munro highlight that the engagement professionals they spoke to where keen to highlight that they supported community development through heritage initiatives, and that many staff were worried that further development detracted from museums 'core' functions (Morse and Munro, 2018, 368). Even museums adopting a role as facilitators or mediators of public discourse – which arguably museums are better equipped for – proved too resources-intensive for many. P2 noted that colleagues at another museum had worked extensively on decolonising their collections, and as such had received a lot of vitriolic comments online. In response, their museum had had serious discussions about whether this kind of engagement was feasible with the size of team they had – as they had no resources to help moderate the discussion. P7 similarly cited a lack of resources for moderation, and admitted they 'tend to shy away from' online engagement (P7).

You know, suddenly when people start leaving lots of comments, and maybe it goes in the direction you're not looking for... if you're the only one sorting it out, it's maybe not what you want to be doing on top of lots of other things. (P7)

This helps elucidate why Black Lives Matter, despite being ubiquitous in the news, was not well represented in the population dataset. It does seem, for the most part, that during the pandemic museums turned to light entertainment.¹²⁴

5.4 The Crux of the Problem

A reoccurring theme that re-emerged throughout discussions was the lack of resources for online initiatives. This topic was ubiquitous – even amongst participants from seemingly well-resourced organisations. Consequently, managing

¹²⁴The wider context and implications of this finding will be explored at length in the discussion (p. 246).

scarce resources was the key factor in most organisations' decision making, and has become a core theme of this study. In order to establish exactly why participants felt so over-whelmed and under-resourced, over the course of this chapter I will explore the different factors that have contributed to this apparently sector-wide issue.

5.4.1 A Lack of Staff

While some interviewees did explicitly discuss institutional priorities, the ways in which digital skills are valued – or not as the case may be – is clear in the division of staff time. When participants were asked about their role and the daily responsibilities, the majority reported a very broad range of tasks ranging from marketing and events to ‘events, education, engagement... [to] responsibilities like marketing, staffing, keeping the roof watertight, all those things’ (P11). For the vast majority of participants, social media and websites was not their primary focus or a significant portion of their role, as P9 noted of their own organisation ‘everyone who does social media has also got another job’ (P9).

Few museums in the UK have a dedicated digital team, and those who do often sit uneasily between departments. As a consequence, many participants worked alone on digital initiatives, whether it was on websites, online exhibitions, or social media.

So, I'm the only one with the digital remit as part of the team... however, [due to my previous role in the museum] all of the questions for that [previous project] and all of the ongoing issues also just fall to me... But it is siloed, like in most institutions... I'm largely independent in terms of the digital work. (P1)

As a consequence – whether it was officially the case or not – the majority of participants felt that they worked alone as a ‘a one-person team’ (P8). The exception to this, was the experience of P5, who worked as part of a dedicated digital team at a larger institution. The digital team had not been siloed, but had an active role in decision making across departments.

I mean, we're probably one of those teams that seems to talk to everybody, like I feel like I know everyone involved in every team just because of the nature of what we do. I think if you work in audiences and comms, you have to have a very holistic understanding of how an organization works. (P5)

With multiple full-time staff members dedicated to social media and a detailed strategy, P5 had helped grow one of the largest social media followings in the country. As such, their experiences stood in contrast to their peers, even at other large organisations.

For the other interviewed participants – especially at small and medium sized museums – their roles were less codified, and many had slowly accumulated digital responsibilities. P10, who was a trustee at the museum noted that they had taken on digital responsibilities at the behest of their colleagues, while P12 had originally had a much more specific role specification that then grew:

I am assistant culture and heritage officer... to be honest my role is massive now... on paper, it's supposed to be culture and heritage, supporting community groups, increasing lifelong learning, that kind of stuff. But it's branched out into digital interpretation, just deal with [websites and social media], deal with everything. (P12)

There was a widespread sense amongst participants that 'if [they] don't do it... no one else is going to do it' (P9). P7 had an enormous range of responsibilities: from opening the site; to applying for grants; and managing volunteers, yet still took on the museum's social media.

I mean, because we're a very small volunteer organisation, it's only myself doing five days a week – my colleague does two days a week now. We're the only paid staff... So essentially, it really does fall to me generally, which is fine, to do the social media and things. (P7)

The one place where social media had been explicitly factored into roles appeared to be in marketing and events teams. This is likely a contributing factor of why so many museum accounts focus on programming content. Rather than a general digital strategy that advertises the museum and its collections more widely, accounts often instead focus on the goals of the events and marketing team. As participants noted, if there aren't enough people signed up for a certain event, they will try to use social media to bolster numbers. As such, even though engagement is often mentioned, the focus of many account managers is in support of museum events, which is where their main responsibility often lies. The content of museum social media posts then, reflects how digital roles are positioned within a museum's organisational structure.

Otherwise, throughout the interviews it became clear that very few institutions valued digital skills or had prioritised digital within their strategy. As P5 summarised:

Social media is often considered to be a bit like, you don't really need to know what to do on social media. Like, 'blah blah blah, we'll just shove it on an intern'. (P5)

The overburdening of staff – including unpaid overtime and unpaid internships – is endemic within the sector, and a direct consequence of the long-running funding crisis in museums.¹²⁵ However, multiple participants argued that digital staff were uniquely affected because of the undervaluing of digital skills and labour. Half of the interviewees had relied on unpaid team members – including interns and work experience students – to manage social media accounts.

We did have a work experience student last year who did two Instagram reels... I certainly think they were very good quality for what was, you know, something for a work experience student to do. (P7)

However, most commonly, social media was taken on by a passionate individual voluntarily, in addition to other responsibilities. This appears to have set a precedent within many organisations who have continued to ask new staff to take on this responsibility in an unofficial capacity, in addition to the work within their job description.

When I started in my role, which was about a year and three months ago, I was also working with an intern who was with us for about 12 months. So, [they] had maybe nine months with me directly, and they were great. [They] helped me a lot with the social media side of things, content creation and so on; [they were] very, very creative. But [their] internship finished and the project that [they] were employed as part of finished as well. So, now [they have] moved on to a different charity and I'm on my own again. (P8)

We had two paid for attendants... one of them it was very keen on social media, so he got a lot of the YouTube type things going, Instagram, and so on. Now he's now moved to [a larger institution] as a media officer for them, which has left us at the museum with no one to actually do a lot of this social media posting. (P10)

[Previously] social media was covered by the front of house team, but we've structured it differently because all the staff left. (P11)

¹²⁵See the literature review for an explanation of the wider funding context and how this was exacerbated during the pandemic (p. 12).

This reliance on junior or temporary staff members to build and maintain social media accounts and digital infrastructure has put museums in a precarious situation. The high turnover rate within this group means that the knowledge accumulated within the museum through practice and training is regularly lost. Without adequate handover documentation or training, many found that it was impossible to continue the run an account after a staff member left. Two participants had been forced to abandon platforms entirely, as the passwords for the museums' accounts had been lost. During the first round of interviews, P3 recounted a number of times that the museum had been 'left in the lurch' by an individual leaving.

We also had a website that had been designed and built by a guy who was an IT professional and the son of one of the previous trustees. And it was the usual recipe for disaster in terms of longevity. It just fell into non-maintenance unless we paid him some money every time something was changed... Because people put links in and it was staying there for several years, the links were dying – so you get the famous error 404... [a volunteer] built this wonderful Excel spreadsheet, and everything was colour coded. [They] knew what everything meant, but... to us it was just a wonderful, pretty pattern on the screen... and the danger of this kind of thing is the second that one person leaves, who knows exactly what's going on? (P3)

As P3 indicates, smaller organisations often turned to a network of family, friends, and acquaintances for digital expertise. The result was that many organisations had non-museum staff running social media and websites in an unpaid capacity.

My secret weapon is my son who's in digital marketing... my occasional free consultant. (P3)

Well, he technically is a website builder, but he did it for free... he's still kind of, overseeing it, but then we can add stuff as and when we want. (P9)

5.4.2 A Lack of Expertise

Small museums' reliance on external help appears to be a result of the low level of digital expertise in these organisations. Participants noted that their colleagues were unfamiliar with basic digital skills, such as copy and pasting text or creating power points.

It's just getting people to do it... because of my working life before I retired, I'm quite comfortable just taking things and copying and pasting that. And once you get your head around that, you don't worry about preparing things in the same way. (P3)

A few months ago, I had to do a tutorial on how to use PowerPoint properly, which I thought was really random. But then it made sense, because they were all saying 'we see you do talks and stuff in the villages and at the museums and we don't know how to use PowerPoints'. (P12)

Talking to multiple staff from smaller unaccredited museums, it is clear that the levels of digital capability in the sector have been overestimated (Noehrer et al. 2021). This may be a consequence of the bias towards larger and accredited museums which has pervaded research in the sector.¹²⁶ The help currently provided, such as resources from the National Lottery Digital Skills project and the Museums Association, are predominantly in digital formats. Yet an older generation of staff and volunteers, are more likely to turn to traditional media such as books for information. P4 was an older participant who had made a sincere effort to take over the running of the museum website when a volunteer left.

But I mean, we actually bought the *Dummy's Guide to WordPress*.¹²⁷ Well, for a start, I could hardly understand what the book said. And secondly, there wasn't any resemblance whatsoever to the WordPress that we've got, so it was a complete waste of money. (P4)

The rate of change with digital technology quickly renders books obsolete, however, this important group of older practitioners – who are instrumental to a large number of unaccredited and volunteer-run museums – face multiple barriers to accessing online resources. Only 35% of volunteers in the DASH survey felt they had the digital skills to conduct online research (Newman et al., 2020, 32). The fact that the majority of resources and guides for digital tools are themselves online is particularly unhelpful for those unfamiliar the technology. The continuous change of platform interfaces – as alluded to by P4's trouble with WordPress – and the emergence of new platforms have resulted in a continuous learning curve.

¹²⁶Interestingly, this lack of commonplace digital skills does emerge within accounts by museums practitioners although it is rarely centred. Nigel Taylor-Jones wrote for the Museum Journal in 2020 about his success online, but notes that the steepest learning curve was '[learning] how to email large files' (Taylor-Jones 2020).

¹²⁷This is a reference to the book *WordPress for Dummies*, by Lisa Sabin-Wilson. Originally written in 2007, the the most recent edition at the time of writing was released in 2021.

5.5 Platforms

5.5.1 Young People and Social Media

Amongst many participants there was a widespread assumption that younger people have a natural affinity for the digital.

Instagram – it's been set up by the young staff member – for that particular [younger] audience... so that material can be particularly targeted towards them. (P2)

Well, the museum is a charitable trust run entirely by volunteers. I'm the Treasurer of the Trust, and for my sins, I'm about the only person that understands the ITs. I should perhaps have said, that I'm one of the youngest ones.¹²⁸ (P3)

The belief that digital skills are somehow inherent in younger people belies the real skill required to run these accounts successfully. In addition to the undervaluing of digital skills, this may also have exacerbated the trend in digital responsibilities being given to more junior colleagues. The perception that young people are more likely to be familiar with social media is not misplaced, although it is platform specific. While two thirds of Facebook users are 35 or over, just over half of both TikTok's (52%) and Snapchat's (51%) UK visitors are between 15 and 34 (Ofcom, 2021, 32; Ofcom, 2022a, 59-60). The ability to reach 'a different, younger audience' (P9), was a major consideration of participants when adopting new platforms and technologies.

I would say like one of the main audiences that we're trying to reach through socials is the younger audiences. So below 34 years old... our audiences who come through the doors tend to be rather older. (P8)

While participants could reach older audiences through advertisements in traditional media including local papers, it was widely assumed that social media was the best way to reach younger audiences. However, the efficacy of social media at diversifying museum audiences is questionable. The Cultural Participation Monitor found that 'more than half of audiences engaging with Museums and Heritage online are aged 55+' (Walmsley et al. 2022). Similarly, the profiles of online

¹²⁸It should be noted that the participant in question was in his late 60s, showing that it may not be youth per se, but one's relative age that counts.

audiences during the pandemic were discovered to be similar to in-person visitors in 2019 (The Audience Agency 2021). There are a number of reasons this may be the case, and I will return to this question throughout this section. However, the first is the simplest. Facebook, which is the most popular platform amongst museums, generally has an older average audience. This was acknowledged by some of our participants, who had turned their attention to platforms with younger user-bases.

I think we need to grow our Instagram and possibly move into the other areas, such as TikTok, especially if we need to target younger audiences. (P2)

Young colleagues were therefore thought to be better equipped to create posts for both young audiences – and younger leaning platforms. This makes some sense as a familiarity with the platform appears to better equip individuals to build a substantial social media following. Participants with the largest online followings specifically attributed their ability to build audiences to their use of the platform in their free time.

[My colleague] knew loads about the platform, [they] knew what was trending – classic 2020 style – had spent hours and hours and hours and hours a day on this app because there was nothing else to do, so [they'd] really got [their] finger on what was successful and what people wanted to see... I think so much of that learning comes with the nuance of using platforms constantly. (P5)

Many participants noted that the platform that performs the best is the platform that they use in their personal lives. P12 noted that their social media accounts were 'really, really good for a small museum service', but the expertise behind running them had really come from their 'own personal passion' and their time investment outside of work (P12). Many participants did not explicitly make this link themselves but found that their preferred social media platform just happened to be the one where the museum performed best. As P7 realised:

[Our] Instagram seems to do surprisingly well... actually, that is the only social media I use personally. (P7)

5.5.2 Tone, Trust, and Authenticity

The regular use of a platform likely increases a participant's fluency in the communication norms of these online spaces. Most commonly referenced was younger participants ability to inhabit a casual register – characterised by familiarity and humour. This type of communication is part of a broader trend of 'calibrated amateurism' that is widely used on social media to establish a relatable presence and build trust with audiences (Abidin 2017). This was explicitly discussed in interviews but is also clearly evident in the tenor of the successful account managers' answers. For example:

If you ever see on our social media a really stupid post, it's me. If you see something really daft, it's me. And the thing that's quite funny is they usually always do very well... my line manager always says, 'people must be daft as you are'. (P12)

It's really interesting for me to see how museums can record like really funny content sometimes with their collection... we haven't really been doing it, but it's interesting for me to observe. (P8)

This adoption of both humour and an informal tone of voice was seen to help establish trust with audiences and fosters a sense of familiarity with other users. This approach starkly contrasts Peter Walsh's 'Unassailable Voice' and the top-down forms of communication that museums have traditionally relied upon – even on digital platforms (Walsh 1997; Gronemann et al. 2015; Brown Jarreau et al. 2019; Zhu and Nam 2022). Interestingly, the unassailable voice closely mirrored a description of P5 of the museum's pre-pandemic communication strategy.

[Over the course of the pandemic] we weren't like we – the Royal we – as content creators, we weren't doing our normal thing of 'please buy this ticket'.

Here, this one-directional communication strategy is strongly associated with both a corporate tone – 'the Royal we' – and a focus on ticket sales. P5 goes on to contrast this approach with their new focus on education, and consequent shift to collections content and a more conversational approach when museum sites closed in 2020.

This association of tone and sales reflects a previously prevalent attitude on social media that contrasted the authenticity of the platform and influencers with

traditional media outlets (Lee and Eastin 2021). Tone on social media, became an integral part of conveying one's authenticity as an individual. This is highly associated trust and has been characterised by enabling influences to perform advertisements that are understood as word-of-mouth recommendations rather than traditional advertising campaigns (Hudders et al. 2021; Lee and Eastin 2021). This has somewhat shifted over the last decade, but the association of authenticity, trust, tone, and sales remain inextricably linked.

This close association was evident amongst participants, many of whom placed an emphasis on authenticity.

The post needs to be authentic and genuine. It can't be perceived as a photo that there's a stock photo that doesn't relate to the actual experience the customer will receive... they will believe future posts that little bit less. (P6)

Authenticity is highly valued on social media, and tone is a fast and effective way to establish both it and trust – words which were used interchangeably by many participants.

But what does trust mean for social media users? While a survey by the Museum Association found that museums are highly trusted by when it comes to giving accurate factual information, this is not the kind of trust that is predominantly meant when discussing social media (BritainThinks 2013). When P5 talked of trust, it was based on the museum's ability to entertain:

I think people trust their favourite creators more when they're putting out content. People will watch longer videos when they're watching creators that they know, because they trust that they're not going to waste 40 minutes of their life... I do it myself. I'll get home and I'll be like, 'Oh, what do I watch?', and then I end up watching the same creators over and over again. (P5)

On social media, consistency is bound up in notions of authenticity. A study by Oliver Haimson et al. (2021) saw multiple participants define authenticity as 'staying consistent' – both over time and across different forms of media (Haimson et al., 2021, 423:7). Amongst participants, ticket sales, additional visitors, and higher engagement were all outcomes associated with both authenticity and trust between museums and visitors. Yet, despite widespread findings in marketing studies that indicate adopting a 'human tone of voice' increase both levels of

engagement and trust in organisations, many museum practitioners still see adopting an informal register as a risk (Jeong et al. 2022). As P7 admitted, ‘I do play that very safe because I just, I don't want to cause any issue’ (P7). P2 noted that clear guidelines had been released with the aim of creating a coherent organisational tone that helped mitigate the differences in communication between individual staff members as well as codify an informal tone.

And we've got a new brand since the beginning of summer and our voice is – I mean, there are official words for it – but I'd say it is quite informal in many ways. It's quite happy and friendly rather than trying to be dictatorial or academic – so, it's being a lot more personal. That's our general brand. Our social media voice before that... obviously it depended on who puts the post out. (P2)

This kind of policy and guidance also has the benefit of helping staff achieve the informal register while mitigating the risks of creating a post deemed inappropriate. This dictated style – or ‘posting by committee’ as P5 described it – can also extend to the content of posts, a fact that appeared to frustrate the best performing account managers.

Let me say that...Oh, I couldn't possibly say. It appears that in certain museums there's a hierarchy. And sometimes the content comes from the top and kind of works its way down into social media; it isn't native to social media, and it isn't designed *for* social media. And I think that the thing social media teams – or audience teams – are fighting for, is the fact that *we know best*. We know the kind of the people who are actually visiting [the museum], the kind of people that are buying tickets and walking through the door. We know that audience better than anybody. So, you should be planning what you show on social media around that and not the other way around... You need to create that kind of loyalty, trust... like if you know that person's going to visit on that day, make sure there's something for that person. Don't create something and then hope that someone walks through the door... (P5)

The response of P5 aptly summarises the complex link between consistency, trust, authenticity, and how this plays out on social media. Notably, P5 attributed much of their success to the freedom and trust placed in them by the management of the museum. This enabled them to adopt an informal tone and better build relationships with visitors. However, they understood they were in an unusual position, in their own words, they were ‘very lucky to have buy-in from kind

of higher management' (P5). Trust on social media is therefore twofold: audiences are encouraged to trust the museums' posts and the humans behind them, while those account managers, in turn, require trust from the museum management.

5.5.3 Being Left Behind

While there is a fear that adopting the communication norms poses a risk to museums, our participants clearly highlighted the dangers of failing to adapt to these platforms. They noted however, that this was a continuous process, and while familiarity with a platform helped participants, the inverse is also true – it is difficult to build a large audiences if you do not regularly use a particular social media site. P11 had worked with social media since 2008 and noted that the rapid change of these platforms made regular use crucial to success.

I think you have to live and breathe these platforms to be good at them. Otherwise, it can just look like an old man, trying to be a young man's game... [A colleague] and I were both really involved with Twitter... but because I was not running a museum account for a while [having temporarily left the sector], I wasn't engaged with it. And I came back and there's a whole plethora of different choices now, and the learning curve on it is too steep for me. I don't have the time to devote to do that. (P11)

This experience had informed their digital strategy more broadly, and they did not find it worthwhile to train individuals who were not regular social media users – ruling out many of the older staff and volunteers who had enquired about running the account.

We don't empower the staff to do it because they don't do it themselves in their own lives. It would be different if they were good at it, knew how it worked and were competent. Unfortunately, none of them are. In an ideal world, we'd give them advice and let them do it, but they do not have the competency. (P11)

This appreciation for the difficulties of using social media only came from participants with high levels of online engagement. For the most part – as is indicated by the delegation of digital media to junior staff and volunteers – participants reported that wider management teams were not aware of the barriers to success on social media. This is prevalent both in and outside the museum sector. The

‘calibrated amateurism’ prevalent on social media – and characterised by the image of a teenage vlogging to millions from their bedroom – obscures the long hours, business acumen, and equipment that are essential to growing an online audience (Marwick 2013; Abidin 2017). This contributes to the prevailing belief that anyone – no matter how under-resourced – can achieve social media success (Ashton and Patel 2018). Therefore, it is unsurprising that museums have unrealistic expectations of staff with no time or resources and are likely only further encouraged by the sector’s few success stories. However, it was only those familiar with personal experience of a platform understood the resources required to succeed at it.

5.5.4 Chasing the Algorithm

To reach new audiences through social media – which requires a museum’s posts to be recommended beyond their existing follower-base is particularly resource intensive. As highlighted in the literature review ‘rich media formats encourage more clicks than static plain-text content, but video-based content has the greatest impact on encouraging clicking behaviors’ (Pletikosa Cvijikj and Michahelles 2013; Moran et al., 2019, 541). In part because of these behaviours, social media platforms have increasingly prioritised short-form video content, making videos more likely to be recommended to users than text or image based posts (Meese and Hurcombe 2021; DeGuzman 2024). This has long been reported amongst news organisations, but also see evidence of this in the quantitative data (p. 150), as well as amongst participant responses:

[The most successful posts] are definitely video at the moment. So we started doing Instagram reels about less than a year ago and we try to do them weekly... these short storytelling formats are going to be most of the content in the future. (P8)

Yet, compared to text posts or images, videos often require more time, equipment, and expertise to create. While photos have been shared widely on social media for over a decade, the new emphasis on video only became widespread in 2020 as more platforms turned to short-form video (Kaye et al. 2022). As a result, staff had had less time to acquire appropriate equipment and develop expertise in new editing software. Recording audio requires new equipment, and poor sound quality has been proven to detrimentally effect engagement, with a mismatch of

visual and audio stimuli contributing to cognitive overload (Yang et al. 2025).¹²⁹ Audio quality contributes more to the perceived quality of the video than the visual stimuli (Hands 2004).¹³⁰ As such, many influencers suggest the prioritisation of high-quality microphones over good cameras, yet many museums do not have this equipment (Marsh 2024).

This contradicts prevalent advice in the museum sector, which argues that no specialist equipment is needed at all – and where it does suggest investment focuses on cameras. In 2020, the Museum Journal released a collection of articles encouraging museums to start posting content online. In her interview, Nicola Euston highlighted that ‘all of the content [uploaded during the pandemic] has been produced without any budget. This has been a challenge as we initially thought that we would need better equipment and software but the team overcame this by sourcing free software that we could use’ (Euston 2020). Similarly, Nigel Taylor-Jones (2020) argued he was able to create video content with what he already had, including his own mobile phone.

There is certainly an argument to be made that getting the first post up may represent the biggest barrier to many practitioners who are not yet confident posting online, and that this line of reasoning may help them. But it is significant that the posts discussed by both interviewees had a few hundred views and a handful of likes – placing it on par with textual posts on the same channels. These posts do not represent the type of content which is able to reach a broader audience through the recommendation algorithms. P5, whose videos have millions of views and a significant reach outside of traditional museum-going audiences highlighted just how important video quality is to levels of engagement.

Video quality makes a massive difference... you need to be posting something that's been shot on either a up to date iPhone or I do a lot of my filming on a DSLR, like a proper, proper camera. And then I put it into Premiere Pro and I edit there... I think TikTok prefers professionalism and it likes that kind of thing and it'll push videos that are beautifully shot and high quality to people. (P5)

¹²⁹The impact of audio quality on enjoyment of a video is relatively difficult to measure. Perceived quality – especially with moving images – differs from the resolution or real quality of media due to a number of complex cognitive processes (Jumisko-Pyykkö 2008). Studies suggest that high visual resolution increases the perception of audio quality (Reeves and Nass 1996), however, as the visuals worsen, the audio becomes more important (Reeves and Nass 1996; Beerends and De Caluwe 1999; Jumisko-Pyykkö 2008).

¹³⁰The main exception to this is high-motion content such as sports videos, where image quality is more impactful (Hands 2004; Jumisko-Pyykkö and Häkkinen 2005).

The ‘push’ here refers to the recommendation algorithm and the prioritisation of showing certain types of videos to more users. However, high-quality video is not the only attribute of a post that is prioritised. The other most widely acknowledged factor was the frequency of posting. P2 highlighted that ‘you need to be doing it every day, twice a day, to get it done properly’ (P2). They had not attempted this upload schedule themselves but were aware through colleagues at other organisations of exactly what success on social media required, acknowledging that ‘we can’t do that at all’ (P2). P12 was in a similar position:

When you look at the very top performing museums on TikTok, they are incredible, but it's so much effort. It's really posting a video every single day. That's ridiculous... we always have to reel ourselves in because as great as we do online, we're a small service... there's three of us, so we've had conversations internally – do we want an Instagram, TikTok? But the answer has been no. (P12)

As a result, the digital strategies – such as high-quality video and daily posting – that are most likely to result in larger and more diverse online audiences are far outside of the means of most museums in the UK. As P2 argued, adopting video formats as well as starting TikTok were both ‘very time consuming to do properly’, and that the frequency of posting meant that they were ‘without the means to be able to continue it’ (P2).

So you can spend all your time on social media and do nothing else. You know, if you're running a museum, especially if it's a volunteer museum... one of the things I say to them – they're like maybe 60 years old, they're a volunteer in a museum – and they're like, ‘oh, we want like an Instagram and a Twitter and a Facebook and a TikTok’. And I'm like, how? Where is the time going to come from to do all of this? (P12)

TikTok – which is one of the platforms with the youngest user-bases – is especially resource intensive. This may explain the low level of UK museums with accounts on the platform. Even P5, who personally found TikTok the most enjoyable platform to work with, argued that it was not suited to all organisations.

It's massively draining on capacity... TikTok is super hard work because the algorithm rewards people that post five times a week, every day. (P5)

They note that social media platforms are especially bad for institutions as they were not able to batch film content all in one go. In order to be shown widely on the platform, videos had to conform to trending topics and formats. Unfortunately, these change daily, so content made ahead of time runs the risk of having ‘gone out of date by the time you want to post them’ (P5). They had found that posting the video regardless resulted in a flop, which they found particularly demoralising, especially having spent so long putting the video together. As they summarise, ‘It’s super hard trying to fight the algorithm’ (P5).

I think it's hard to be successful on the platform consistently... You have to recognize that just because you understand it one week, doesn't mean that you can apply the same knowledge the next. You just have to be aware that everything's constantly evolving, and you've just got to try and stay on top of that. (P5)

This constant change and the lack of understanding of why some things did well and others did not, had demoralised other participants, with it being described as ‘a dark art’ (P9), or ‘a necessary evil’ (P3). As P9 elaborated:

I have no idea why that was popular... every so often something goes a bit viral or alternatively it doesn't. And you're like, well, why that and not that? You just don't know why...it's difficult to really work out what's happening. (P9)

There is, unfortunately, is no clear solution. Because recommendation algorithms are black box algorithms, not even their engineers know entirely why one post is chosen to recommend to users over another. While we can use large-scale datasets to identify general trends and attributes of posts that are likely prioritised, these algorithms are constantly changing. It is therefore impossible to create training for museum practitioners to improve how many people their posts are shown to without it becoming quickly obsolete.

This rapid pace of change is likely the primary reason why regular users of the platforms find it easier to build substantial online audiences – they are better informed about the recent changes implemented on the platform. This extends beyond content, which is in constant flux. to the format of posts. That the form

posts take, is as important – if not more vital to success – than the content’s meaning is a widespread idea on social media (Bishop 2018).¹³¹

5.6 High-performing Topics

5.6.1 Local History

When asked directly what performed best – however the participant wished to define this – most raised local history. Due to the diversity of topics incorporated into local histories – which spans transport and industry, to biographies of individuals – this did not emerge as a coherent topic during the Population Study or in the exploration of Word Frequency. I therefore followed up with participants to delve into the specifics of what this included. Four participants then highlighted archive photos as their best performing posts, especially when they were about the local area.

I like putting out really unusual archive photos. I really like those and they always do really well. (P2)

[The ‘On this day’ posts] will be a death date, birth date, an event that happened... I like random ones that sound like they have nothing to do with [the local area] but they do. (P12)

Interviewees did not have hypotheses for why these posts performed well. However, it may be because local histories focus on a specific geographical area. As most of these museums online followers resided in this region, they are most likely to have familiar and personal ties to the histories represented in the collections of local museums. Therefore, locals to the museum – if they have always lived in the area – are likely to encounter parts of the archive that are related to their family history or own childhood. The strength of nostalgia as a motivator for engagement was raised by P9, who highlighted:

[the best performing posts are] sometimes collections that are related to an old building that no longer exists or something. (P9)

¹³¹This is perhaps most evident in the rise of self-styled ‘social-media gurus’ who promise to help individuals design their posts in such a way that it is more likely to be disseminated by the platforms’ recommendation algorithms (Bishop 2020). The uncertainty and transient nature of these ‘rules’ of the algorithm – compounded by the financial rewards that come from being ‘pushed’ by the algorithm – has led to growing mysticism surrounding how it works.

However, there is an alternative explanation that is found in the wider engagement literature in both museum studies and marketing. While content under the umbrella of ‘local histories’ is related to a specific area, the majority of these posts centre the stories of individuals and their day-to-day lives. In the wider communication literature, a strong narrative – especially when deeply personal – has been found to increase engagement on a social media platforms (Georgakopoulou 2020; Romney and Johnson 2020). However, as Paige Brown Jarreau et al. (Brown Jarreau et al. 2019) identified, museums rarely included personal narratives – despite the success of this strategy being well established. Local histories then, may be performing well because it is disproportionately dominated by personal narrative compared to other forms of museum posts.¹³²

P4 highlighted that the posts with the broadest international reach, were about the lives of two famous figures central to the museum’s collection. They argued that stories about the local town did well, but that the stories of the individuals – while still embedded in local history – had an entirely different, and much broader audience.

5.6.2 Genealogy

In discussing local history with other participants, it quickly became apparent that Scottish museums were seeing high levels of engagement with international audiences on ‘local history’ posts.¹³³ The reasons for this were proffered by multiple participants. P9 – a curator in a rural Scottish museum – noted that:

With Facebook, I would say it’s probably 50% local people, and then we’ve obviously got the diaspora as well. (P9)

This diaspora – predominantly due to the lowland and highland clearances in the eighteenth and nineteenth centuries – saw many families forcibly evicted from large swathes of Scotland and emigrate away from the UK. As such, a large proportion of Scottish museums’ international audiences are those with Scottish heritage. Multiple participants were bemused by the unanticipated consequences

¹³²Interestingly, Jarreau et al. also highlight the utility of using social media to help audiences ‘get to know museum staff and researchers, what they look like and what they do on a daily basis, through Instagram visuals and captions’ (Brown Jarreau et al., 2019, A06:4). This was not widely used in their dataset of 1,080 Instagram posts, but utilising our larger dataset, we can see that posts containing the phrase ‘behind the scenes’, so have higher than average levels of engagement. P6 even went so far as to raise ‘behind the scenes content’ when asked about high performing posts which were ‘... sometimes behind the scenes of the site, running things, mowing the grass, or conserving the brickwork – the real kind of nitty gritty of how people go about things’ (P6).

¹³³In total four participants were based in Scottish museums, P3, P9, P11, and P12.

this had had on their museums. P3 noted that their entirely volunteer run museum had received a £250,000 donation from a man in Australia who shared his name with their local town. Despite never having been to the museum in person, with no children or descendants the man had decided to donate his estate to help preserve their local archive. P3 attributed this donation to the existence of their website: ‘word is obviously getting out... the family and club names that came from this area generate interest when people are doing searches for family history in the States’ (P3). Having recently enabled Google Analytics on their website, they had been able to track where their online audiences were visiting from.

[due to analytics] we can see quite precisely where people are looking. And yes, you get ones from all sorts of unknown countries around the world. But we do get a steady stream from the States and Canada. In particular, in fact, in America, there is a town [named the same as ours]. And we're on the mailing list for all their local community stuff because we keep getting bombarded with stuff about the [town's] community. (P3)

While they were primarily talking about website views – which do not form part of the analysis presented in this thesis – this interview prompted a re-evaluation of the larger dataset, resulting in finding that Scottish rural museums had particularly high levels of engagement during the Population Study (p. 160).¹³⁴

This quantitative data and later interviews would suggest that these large international audiences for Scottish museums were not isolated incidents. All four of the participants based in Scotland mentioned it, and it appears to take two forms: general interest in the area and its history; and direct enquiries about accessing archives to do research on genealogy. P12 noted that they ‘get it all the time. We get genealogy inquiries constantly from all – and I mean *all* – over the planet.’ (P12). This resulted in a higher average level of engagement with their posts and website:

You know, there's people from all around the planet are reading our stuff. There's a lot of expats, a lot of people from North there just off in North America. Australia, New Zealand, and then multiple other places that are just reading all our stuff. (P12)

But perhaps most unexpectedly, P12 had found that this increased engagement did directly translate into on-site visitors.

¹³⁴This highlights the advantage of the iterative model adopted in this research and performing interviews concurrently with the data analysis (p. 54).

We find it really benefits us because those same people tend to come in... We've had people from the USA, rocking up to the museum. And it's not a huge museum... they've come from somewhere in the US and they're like my first experience with you was the Facebook and the website. (P12)

This is all the more remarkable, for the fact that the Scottish museums who reported this, were all small and volunteer run organisations, with few digital resources. This contradicts the experience of many English museums who, despite high levels of engagement with social media do not see this impact their on-site visitor numbers. As P5 notes:

39% of our audience on TikTok all live in the United States, which means that it's highly likely that 39% of all the people that follow us are never actually going to visit the museum. They might not even have a passport, they might not have ever left the country, they might have no intention of visiting the UK. And even if they do, it's quite unlikely that they're going to visit [this specific area]. (P5)

Yet this was clearly not true of rural museums in Scotland. P11 reported that 15-30% of their on-site visitors were from the US. This is remarkable when it is understood that this museum is over an hour's drive from the nearest town, and significantly further from either Glasgow or Edinburgh and the country's international airports. The volume of in person and online inquires at P12's museum was such that they had hired a full-time genealogist.

This service was provided for free with a small charge requested for access to documents in the National Records in Scotland, housed in Edinburgh. A number of participants had discussed whether it would be possible to better monetise this interest in their collections:

We actually had this conversation as a group the other day about the fact that we've all got really strong genealogical collections, you know, census information, and craft details of that kind of stuff, and none of us make money out of it, or if we do, it's erratic at best. (P9)

P9 highlighted two primary reasons why they were hesitant to monetise their collections. Firstly, they 'weren't too sure if the service [they] provide is professional enough to charge for' (P9). And secondly, they questioned whether charging

would be taking advantage of their volunteers who do much of the genealogical research, as they do it to help others as a passion project.

In addition, P2 – much like P9 and P12 – expressed that it all helped their local area, and it was therefore not a priority for the museum to directly benefit from these queries. As P9 described:

The logic is that several steps down the line, the money will come back to the community. Maybe not directly to the museum, but if you are sharing people to how amazing our landscape is and how amazing our community is, then we'll likely to come and visit the museum and visit the bed and breakfast and visit the hotels. (P9)

The same logic was used by P12 when describing why their genealogist mainly provided services for free. As a local authority run museum group, the priority was on bringing people to the area. P3 mentioned that their local authority had struck a deal with a local coach company to this effect – tourists would be bussed into the town for their pitstop instead of stopping at a motorway service station.

While I had initially assumed that this international tourism would have been negatively impacted by the pandemic – it became clear that this was not the case. The extra time available the public had resulted in an uptick in interest in tracing family trees, and the time afforded by the lack of on-site responsibility had enabled these museums to produce online videos. As P11 related:

[Video content during lockdown] allowed people to see that actually it wasn't just a local audience... it was people from Belgium and America and Canada, because of diaspora. (P11)

Unfortunately, with the site reopening, P11 had ended their online talk series which had seen such high levels of international engagement. Nevertheless, they were confident that when they had the time they would be able to recapture the moment as they were still getting requests regularly from international on-site visitors to put more online. However, future projects would be dictated by the available resources at the museum.

The depth of engagement with genealogical research highlights some of the limitations of the data analysis and the utility of introducing qualitative methods. The data analysis did not pick up genealogy as it does not present a concrete categorisation of posts, with a reoccurring set of key words. Instead, it presents a

way of grouping posts based on visitors' motivations. A local history post can be of genealogical interest to some visitors, and not others.

As such, it represents a way of audience-first thinking about online resources that is in line with the best performing institutions (p. 207). Most interestingly, it highlights the importance of enthusiast audiences who, when looking for highly specific information, will be deeply engaged and invest time and money in the museums. For this kind of engagement, a minimal digital footprint – a website and a semi-active Facebook page – is seemingly sufficient.

5.6.3 Transport

Transport enthusiasts seemingly fall into this highly engaged category. There is a distinct cultural image of what being a transport enthusiast – especially a train spotter – looks like. This stereotyping is ungenerous in many ways and is not entirely accurate (Letherby 2005). P10 – a collections manager at a transport museum – did say that there were some extreme enthusiasts amongst their visitors. Yet, both the data and the interviews suggest that the high levels of online engagement with transport is more than can be accounted for by a small group of highly engaged individuals.

The diversity and number of posts that received engagement would indicate that there is a real passion for transport amongst the general public. Their appeal appears to extend beyond the existing stereotype of railway enthusiasts, and there are in fact young transport influencers in the UK. Luke Nicholson – who is known online by the name Francis Bourgeois – has over 3 million TikTok, and his posts mainly consist of him trainspotting with a camera strapped to his forehead (Segalov 2022).

There is something about railways in general that seem to attract people.
(P10)

Trains, in the population dataset, are the most engaged with form of transport in general. However, when asked about high performing content P12 mentioned another steam-powered vessel:

If I want easy likes, I can do a post about the [locally moored steam powered ship] and people will just love it. People love the [ship]. (P12)

Similarly, P5 had found that a Facebook post about an old car had been enormously popular, resulting in multiple people getting in touch, and the car receiving

coverage in a national newspaper, 'it's 100% the thing that people latch onto' (P5). They had a theory as to why it was so popular.

I think the other thing is people like transport generally, even if you're not a big car person, people like transport because it's so nostalgic. As a subject, I think you remember what car your parents drove when you were little, because you have so many visceral memories of long car journeys and being trapped in a car on the way to Wales, on holiday or something like that. And I think so many of people's memories are related to transport in that way, because transport pay such a key part in people's lives, whether that be going on a train to a job interview or the first plane ride... or whatever.

They highlighted that people are fascinated by transport 'especially if it is within living memory' (P5). They note that thinking back on past memories prompts online audiences to share something with their friends and family, and ask, 'do you remember this?' or 'remember the time when'. They note that 'It gives people a chance to share what they remember as a child with someone who might not have been there' (P5). P5 found this particularly valuable and had gotten in contact with individuals who had left comments on the museum's Facebook posts to conduct interviews for an oral history project.

This focus on nostalgia and shared memories may also help explain why local history may have been so popular.¹³⁵ Nostalgia has been found to increase inspiration, social connectedness, motivation, engagement, and a willingness to donate (Stephan et al. 2015; Green et al. 2021; Shajia Zaman et al. 2025). While P8 did not mention transport, they highlighted that they saw the most engagement through their posts when they induced nostalgia:

Facebook is where we've got our slightly older audiences, but they're also extremely engaged. So any types of kind of content that evokes memories and emotions will work best on that platform because we will get a lot of lovely comments. (P8)

Nostalgia is clearly a powerful driver of engagement, but it is not entirely positive. While lab studies – including many marketing studies on purchasing habits – have generally found it associated with positive outcomes, this is not necessarily the

¹³⁵Interestingly, modes of transport change at a faster rate than buildings, so it is possible to become nostalgic for vehicles that have only become obsolete in recent years. If nostalgia is a significant driver of engagement, this may contribute transport's popularity.

case in day-to-day life. David Newman and Matthew Sachs have found that nostalgia can produce a negative sentiment in participants, especially when they are feeling lonely (Newman and Sachs 2020).¹³⁶

There is also a less positive side to the transport's popularity. While it certainly does have a broad appeal, P9 noted that transport had been particularly successful at generating comments. However, on their posts they had found:

They always have someone who posts saying, 'oh, that car is an X'. And then someone says, 'oh, no, I think it's probably a Y, look at the headlights', or 'It's a Z'. So it could be like a beautiful landscape with a fabulous signal track road and a bridge and everything, and everyone [in the comments] is like, 'no, no, no, you've got that car wrong'. It always amuses me. (P9)

Comments, even they are disagreeing with the post, are a form of engagement. This reinforces Baym's (2013) argument that these are flawed metrics for measuring engagement, as it is unclear whether or not they represent approval. This issue is evident in the fact that a large number of comments can either represent high number of engaged visitors, a community divided, or a fight over a detail. P9 believed that the posts about transport were successful exactly because they provoked heated debated between different facets of the transport enthusiast community.

With such established online enthusiast communities, it is likely that they are also helping draw attention to a given post and reaching beyond a museum's usual audience. As P10 notes:

You'll find there are fandoms and all sorts of groups specialising [in our collections]. So if I post as a weekly exhibit, it always does much, much better than the other posts because [the online communities] pick up on it and share the posts and so on. (P10)

This is arguably a positive, and akin to the kind of online collaborations that influences regularly adopt to reach audiences of different channels with similar interests. This raises the interesting question of how museums might collabor-

¹³⁶The success of Scottish museums may also have been influenced by nostalgia of the global diaspora. However, nostalgia for an imagined past is a complex topic. Despite the frequent dismissal of nostalgia as a reactionary right-wing sentiment, many researchers argued for a more nuanced understanding of the subject (Medalie 2010; Smith and Campbell 2017; Hakoköngäs 2025). However, this is erring into territory that is beyond the scope of this thesis, no matter a footnote.

ate more broadly to reach their target audiences. Direct collaboration with communities – both online and off – could enable museums to reach their audiences without trying to mould their content into a form that is likely to be disseminated by platforms' recommendation algorithms. This practice, already embedded in museums' outreach teams (Black 2010; Catton and Smith 2021), and the potential for applying the same approach with online communities would be a fascinating avenue for further research (Anderson 2019). Yet, at this moment in time, the majority of online collaborations focus on geographically close organisations, as was highlighted in the network analysis (p. 152). This was confirmed by participants who exclusively mentioned other museums, tourist boards, and local councils as collaborators.

5.7 Conflict and Controversy

But is there a concrete reason to not rely on platforms recommendation algorithms? As has been raised a number of times throughout the results chapter, recommendation algorithms are one of the key mechanisms through which museums can reach new audiences on social media. However, as the Population Study highlighted, controversy or conflict makes a post more likely to shown to users of a platform (p. 174). Posts – on both Twitter and Facebook – that arouse negative sentiments are more likely to be shared widely on a platform (Ji et al. 2019; Li and Xie 2020). A fact that was further highlighted during the interviews.

When asked what performed well on Facebook, P9 had an unexpected response:

The biggest likes are always death notices, always... I did look at [these metrics] for accreditation and I was trying to work out what was most popular – its old photographs and dead people. (P9)

P9 recounted that these were moments when the community would come together to share memories. This communal remembrance likely inspires a response not dissimilar to nostalgia, with users sharing memories and condolences.¹³⁷ Yet there is a darker side to the rallying of community on social media. P7 noted that their top performing post was the theft from an animal from the museum site. Underneath a post that contained a heartfelt plea for the return of animal, the comments were full of unprompted vitriol against a local traveller community

¹³⁷It may also be tempting to link this to the popularity of genealogical research, as death notices can be particularly useful for constructing family trees. However, the death notices referenced here are contemporary.

that some individuals had – without any evidence – decided were responsible for the crime. However, the fact that this upsetting and controversial post garnered the most engagement is not surprising when contextualised with the results of the topic modelling, which found widely shared posts were dominated by war, injured animals, and tragedy.

This finding from the Population Study was again reaffirmed in the interviews, where disasters were also raised as receiving high engagement. Unprompted, P12 highlighted that their best performing post was about a local tragedy:

So last month [there was an anniversary of a ship sinking], and there was a few people from [around here] on it. (P12)

This post had received the highest levels of engagement of the year. However, only one participant mentioned this type of more negative post when asked what types of content have high levels of engagement. Instead, these anecdotes of negative posts only emerged when I asked about their single best performing post. These negative posts were raised by four participants, but each time were dismissed as an outlier and were not considered representative of success on the platform. Many quickly followed up with their second-best performing post, which was their best performing ‘proper post’ (P7).

However, the realisation that this is widespread – made clear through the combination of multiple museums’ data and participant experiences – is unavoidable. As much as museums may consider themselves using social media for educational purposes, or to reach new audiences, they are reliant on the same recommendation systems that have been so criticized for political polarization (Kubin and Von Sikorski 2021), misinformation (Allen et al. 2024), and having a negative effect on mental health.¹³⁸ Although it is unintentional, museum posts can inadvertently contribute to divisions in their local community. Considering that most museums are now conceived as inclusive spaces, and facilitators for open and nuanced dialogue between communities, this kind of interaction is contrary to an often cited mission of museums (Black 2010; ICOM 2020b). This poses a particular problem as museums begin to more widely adopt social media metrics as key performance indicators (Brooke 2025). How would the cultural landscape – and

¹³⁸The research on political polarisation is increasingly divided. While there had been a consensus, a recent study by Andrew Guess et al. (2023) argues that the impact of social media on political polarisation has likely been overstated. It should however, be noted that this argument is relative, and they do not argue that social media does not contribute to polarisation at all, just less than previously expected in the 2020 election. In addition, this paper is highly contentious, as during the period of data collection Facebook implemented 63 emergency measures to reduce the amount of misinformation and inflammatory content on the platform (Kupferschmidt 2024).

audiences' attitudes to museums – shift if their ability harness the recommendation algorithm was the bar for excellence? In optimising their posts to reach as many people as possible, museums may inadvertently contribute and participate in the less savoury aspects of social media.

Ultimately, large online audiences are already inaccessible to the vast majority of museums who do not have the resources to stay up to date with the everchanging systems and trends on a given platform. However, this finding raises the question to what extent such types of engagement are even desirable. In the conclusion, the alternatives – drawn from both the data and interviews – will be discussed in depth as I turn to look at future possibilities for the sector.

Chapter 6

Discussion

This chapter brings together and summarises the discussions from each of the previous studies, contextualising them with the research highlighted in the literature review. It explores the major themes that have emerged in this thesis and is split into three sections. The first – ‘Museums During the Pandemic’ – explores how museums have responded to the national lockdowns and the ways in which this research can be used to inform and improve their digital strategies. While ‘Platforms’ explores ways digital infrastructure now mediates the relationship between museums and their audiences. It highlights how a number of factors beyond museums’ control are increasingly shaping their digital strategies. The final section will look to future developments in the sector, highlighting potential areas of concern and future development.

6.1 Museums During the Pandemic

In the wake of the Covid-19 pandemic, the museum sector has seen rapid and wide-ranging changes to the way visitors engage with museums. With their sites shut for much of 2020, many organisations attempted to stay connected with audiences online. There was an increase in the amount that museums were posting to social media, with the number of both Facebook and tweets increasing in March and April of 2020. In addition, the number of YouTube videos posted by museums to the platform rose by six times in 2020. This finding corroborated many reports from this period, which found that museums had increased their social media use in the early months of the pandemic (NEMO 2020*b*; Kidd et al. 2022).

6.1.1 Inequality from the Outset

Large and medium sized museums were significantly faster to respond to national lockdowns than their smaller counterparts (p. 129). This is primarily due to the reuse of old digital assets. One participant explained how they had attempted to reach new online audiences by uploading old digital assets to the Google Arts and Culture platform, but this practice was widespread. A UNESCO report found that ‘a large number of institutions have also put digital productions, applications and games from previous exhibitions back online to give them a new lease on life’ (2020, 15-16). It is therefore unsurprising that it was predominantly ‘superstar’ museums that were able to capitalise on the apparent demand for online cultural content that had (Gombault and Allal-Chérif 2021; Ofcom 2021). ICOM found that large museums were more likely to provide digital services, while a UNESCO survey of over 50,000 museums, found that large museums – many of whom already had a bank of digital resources – saw the largest rise in visitor numbers to their websites over the first lockdown period (ICOM 2021; UNESCO 2020). Large museums and galleries across the world reported massive increases in their web traffic – the Musée du Louvre reported a tenfold increase in web traffic (Farago 2020).

The use of previously digitised resources enabled museums with existing digital assets and infrastructure to adapt quickly, but hindered those without previous resources and expertise, who were now attempting to create new forms of content with limited staff, equipment, or access to collections (Mairesse and UNESCO 2019). By looking beyond large museums – or those responding to the surveys of international museum associations – it was possible to nuance the findings of these reports, by exploring how other types of museums responded.

For small museums there were numerous barriers – both fiscal and attitudinal – to increasing their digital output. The undervaluing of digital skills within the sector was described at length in the the interviews. However, many of the financial difficulties of the sector can be attributed to the current funding situation in the UK. Over the past 20 years, organisations have increasingly adopted a mixed funding model in which government grants and subsidies are supplemented with donations and ticket sales. As highlighted in the literature review, the proportion of arts funding that comes from the public purse has dropped significantly, while the percentage of income from donations and ticket sales has risen (Ashton et al., 2024, 8).¹³⁹ The Tate – a network of four galleries – currently earns £2 for every £1 provided through government subsidies (The Economist 2021). The pre-

¹³⁹Although, it should be noted that there is still a significant shortfall for many organisations.

valence of this mixed model for funding made UK museums uniquely vulnerable during the pandemic. The emergency funding available was significantly smaller than in other European countries, while ticket sales also dropped (The Economist 2021). Visitor numbers are 10% lower in 2025 than in 2019 – in part because the bulk of museums’ core audiences tend to be older, and this demographic is both spending and travelling less after the pandemic (The Economist 2021; Arts Council England and PS Research, 2025, 5; Ware, 2025, 20). The resulting financial shortfall has been detrimental to the sector, especially smaller museums.¹⁴⁰

While some funders agreed to support the online delivery of their existing portfolio of projects, this support went to museums who already had funding (Euston 2020). This initiative enabled the continuation of many projects in some form, but further exacerbated the gap between those with support, and those without. Accessing new pots of funding proved difficult for smaller museums who often fell between grants, with significant levels of confusions seen across the sector about eligibility (Museums Association et al. 2020). The cumulative result was that, when surveyed, staff at ‘Independent museums’ were the most likely to be worried about the future of their organisations (Art Fund 2020).¹⁴¹ It is unsurprising then, that small museums were poorly equipped to publish more online in 2020. They did not have the resources to experiment or develop new skills in-house, as they received little governmental support (Walmsley et al. 2022).

6.1.2 Engagement

Organisations with more resources can do more online – whether that is posting more frequently, bringing in digital expertise, or giving staff the time and training to experiment with new strategies and tools. It is unsurprising then, that this disjoint between the experiences of different sized institutions emerged. But, while these inequalities reflect those in the wider sector, they are exacerbated online.

In general, online interactions – such as likes, comments, shares, and retweets – are disproportionately directed at a handful of museum accounts. On Facebook this is the most extreme, with just 1% of museum accounts receiving 60% of all interactions within the dataset (p. 148). These top performing accounts are

¹⁴⁰There was also inequality in funding access between regions of the UK. Emergency funding was disproportionately allocated to the South East of England, and 31% of the culture recovery fund went to London-based organisations (Healey et al. 2021).

¹⁴¹This discrepancy has not been addressed in the consequent restructuring of arts funding in the UK after the pandemic. As Sharon Heal highlighted, in the 2024 budget ‘the urgent needs of local and regional museums and galleries have not been addressed’ (Atkinson 2024; Winchester 2024). UK museums outside of major cities remain at risk, with either independently or council-run organisations being particularly vulnerable (Liebenrood 2025; Mapping Museums Lab 2025).

disproportionately large organisations with dedicated social media teams. Meanwhile, for most accounts, levels of engagement with their posts remain low. 70% of tweets and 30% of all Facebook posts over a three-year period received five interactions or fewer, while half of museum YouTube accounts have less than 46 subscribers (p. 132). Most museum posts are only receiving interactions from a handful of users – likely already followers/subscribers familiar with the museum.

Perhaps most unexpectedly, the data from social media platforms suggests that the size of online audiences did not significantly increase over the pandemic.¹⁴² Both the Pilot, YouTube, and Population Studies suggest that the vast majority of museums did not see a growth in online audiences, but a small number of accounts reached many millions more (p. 128). For the vast majority of museums then, the pandemic, and the consequent increase in posting, did not result in more people finding out or engaging with their museum.

Yet, this is not entirely unexpected. Despite the optimism of many in the initial reports, a significant gap in the reception of museums' digital offerings quickly emerged. A NEMO survey published during the first months of the pandemic suggested that '4 out of 5' museums had increased their digital services (2020b, 2-3). Yet that same survey, noted that only '2 out of 5' had seen an increase in online visits (2020b, 2-3). The discrepancy in the size of digital audiences has likely been under-reported in those results. By expanding beyond large museums, the contrast between the handful of high performing museums, and the rest of the sector has become clearer.

The reasons for this discrepancy in online audience sizes are complex, and it is difficult to isolate the impact of contributing factors. As already mentioned, there were existing inequalities in the sector and the funding landscape. However, there is an apparent amplification of these inequalities online. The causes of this, can be crudely separated into two groups: factors within museums; and the factors attributable to the digital infrastructure museums use. The following sections will explore the former, while the latter will be covered in Section 6.2.

6.1.3 A Lack of Resources

The most obvious contributing factor to a discrepancy in what museums can do online and how it is received is the differences in resources available to each organisation. In general, there is a strong correlation between the number of visitors

¹⁴²This was found to be true of each of the three platforms that were studied in depth – Facebook, Twitter, and YouTube – but notably TikTok and Instagram were not included in this analysis.

a year (its size, as defined by the Mapping Museums team) and the income it receives through both ticket sales, donations, and grants. It is therefore unsurprising that larger museums were consistently found to have larger online audiences. However, while this can help secure better equipment — such as cameras and computers – when interviewed, most practitioners were more concerned at the lack of time.

Only a small minority of participants' had digital roles in an official capacity, and social media was often relegated to an unpaid team member (p. 212). This highlights the lack of change within the sector over the past decade. Museums have been repeatedly criticised for undervaluing digital skills and their resistance to new forms of technology (Parry 2010*b*; Marty and Buchanan 2022; Nikolaou 2024). Yet, the pandemic has been credited with shifting attitudes (Art Fund 2020; Crooke 2020; Noehrer et al. 2021). As Johannes Bernhardt argued, it 'has given a new urgency to the concept of the 'digital museum' ' (Bernhardt, 2021, 203). Yet, a large gap has emerged between the rhetoric in conferences and news articles, and people's lived experience of the sector, in which their digital skills were not valued.

Some practitioners were able to fully focus on digital strategies and engagement while sites were closed, and as a result increased their digital output. Yet when museums reopened in 2021, many were asked to maintain this increased level of digital output in addition to their previous duties. More staff time has not been allocated to help maintain this digital output, and many have found themselves more stretched than before (Šveb Dragija 2024). This creeping span of responsibilities has led to a growing 'overlap' between roles, and digital practitioners are increasingly asked to do more with less (Mendoza 2017; Asif et al. 2023).

This lack of time is the primary issue when it comes to improving museums online offerings. Many practitioners are self-motivated and take on digital responsibilities having seen a need not currently addressed by their organisations (p. 211). Given sufficient time, they are eager to make use of the free resources and training currently available (National Lottery Heritage Fund 2021).¹⁴³ The difficulty lies in carving out this time, which requires both the resources and buy-in from an organisation's leadership team.

As it is, many successful museum accounts are run by individuals who have developed digital expertise in their personal time through passion projects. This work is largely unseen, and by their own accounts, rarely valued. By failing to ac-

¹⁴³Finding these free resources is simpler for those within organisations that are members of groups like the Museum Association. In addition, many free resources are not in the places that those without any digital expertise are likely to search (p. 214)

knowledge these digital skills – or how they were developed – an assumption has spread that social media enables museums to reach enormous online audiences with little investment. Yet, this ignores the fact a significant investment was made, though by an individual not the organisation. Many prominent success stories – where small museums have reached large online audiences – were made possible by young and passionate individuals who had a personal interest for social media. While large and well-funded museums are able to achieve social media success by investing in dedicated digital teams (British Museum 2023), these successes from small museums have contributed to a common misconception as to how much work and expertise are required to develop large online audiences.

The Covid-19 pandemic has only exacerbated the demands made of digital practitioners, who have been especially hard hit by the high staff turnover rate in the sector (Asif et al. 2023; Šveb Dragija 2024). Junior staff members were the most likely to lose their jobs during this period (Walmsley et al. 2022). Multiple participants highlighted that those who had taken on the social media accounts as an unpaid responsibility had left the museum for paid jobs managing social media, which aligns with a wider trend of practitioners leaving the sector for more stable employment (Šveb Dragija 2024). Both ‘role ambiguity’ and high workload are driving factors in individuals choosing to leave museums – both of which are acute issues for digital practitioners (Asif et al. 2023). Therefore, not only are museums struggling to develop digital expertise, but organisations are struggling to hold on to the expertise they already have.

Therefore, the talk of a ‘new paradigm’ and digital approach within the sector does not appear to reflect the reality of many practitioners (Noehrer et al. 2021). As Noehrer et al. (2021) admit of their own work, the evidence that support this positive interpretation come from well-funded organisations.

Whilst our case study range is limited to relatively well-funded public institutions based in the UK and the US, our overall findings suggest confidence in the museum sector to adapt and support further investment in the development of organisational digital culture, to ensure the sustainability of museums and their capacity to deliver social mission and public benefit on-site and online in the future. (Noehrer et al., 2021, 9)

However, it is arguable that this confidence is misplaced when talking about the wider sector. Many statements made during the pandemic reflect the experiences of staff at larger organisations – who are also those most likely to be interviewed

or quoted in articles. Through this over-representation, our understanding of the sector continues to be disproportionately shaped by large and accredited organisations (Candlin et al. 2019). When looking at a wider sample of museums our understanding of current practices and capabilities shifts radically. It is therefore understandable that the findings of Noehrer et al. contrast the accounts of practitioners who continue to feel undervalued, even after the radical changes that were allegedly brought about by the pandemic (Crooke 2020; Kidd et al. 2022).

6.1.4 Advertising vs. Engagement

Amongst many museums, there is a narrow vision of what social media can – and should – be used for. Analysis of the text from social media posts, shows that museums predominantly use their accounts to talk about events programming, opening times, and closures (p. 172). A contemporaneous study by Kidd et al. (2022) similarly identified that 73% of the tweets in their sample had a ‘promotional’ tone (Kidd et al., 2022, 24).¹⁴⁴ This is at odds with what museums regularly claim to use social media for. Cassandra Kist’s case study of Glasgow museums services highlighted that ‘institutions prioritize marketing and broadcasting motivations for social media use over engagement, participation, and associated social goals’ (Kist, 2021, 282). As Kidd et al. noted, this may be a result of the fact ‘respondents almost universally noted that social media was the responsibility of those with oversight for marketing’ (Kidd et al., 2022, 24).¹⁴⁵

Yet, simply stating that an event is happening however – as most of these posts do – is not enough to garner engagement, either online *or* off. These posts are on average the worst performing in terms of interactions, and there is little evidence to suggest that they result in more on-site visitors (p. 106). As Walker (2016) highlighted, there is a disjoint between what audiences want from museums and what they actually publish.¹⁴⁶ Stacy Baker even goes so far as to say that the focus on marketing is not only ineffective strategy but ‘many followers may see [these tweets] as a reason to disengage with the museum and ignore future tweets’ (2017, 156). In the interviews for this research, it became clear that many practi-

¹⁴⁴Unfortunately, the temporal dimension of the data was not explored in this study, so it is not possible to gauge how this may have shifted as the lockdowns came into effect.

¹⁴⁵Expanding the sample to include unaccredited museums, as in this research, appears to diversify the departments and roles of social media account managers.

¹⁴⁶There is an argument to be made that this poor experience has now shaped – or limited – audience expectations and user behaviours when engaging with museums online. The UK Taking Part Survey for 2018/19 found that, while 26.6% of UK adults visited a museum website or app, the most common reasons were ‘to find out about an exhibition or event’, ‘to check opening times’ (65.1%), and ‘to order tickets for an exhibition or event’ (Black 2021).

tioners were aware of this disjoint between what audiences enjoy and what they post, but felt obligated or pressured to use social media in this way.

However, the closure of museum sites enabled many to shift away from advertising events and to experiment with different types of content. This appears to be the case across the sector and confirms Alix Geddes (2020) finding that for the four largest UK museums, online content related to collections rose by 70% over the first lockdown. This thesis has also highlights that museums began to post more about their collections as national lockdowns were instated, and stories about objects from the collection were proven to generate far more interactions on average than posts about programming (p. 172).

Yet, as discussed in the Population Study, these posts about collections quickly fell out of favour as soon as museums reopened. Museums quickly returned to an advertising mindset, as the focus shifted to increasing visitor numbers (Winchester 2024). This indicates a step backwards in digital development for the sector, as museums returned to conceptualising the digital as an extension of the on-site experience (Galani and Chalmers 2010; Meehan 2020; NEMO 2020b).

However, there is a certain irony to this shift, as the existing marketing literature would suggest that posts about collections are likely to be more effective at generating ticket sales, yet a lack of data gathering and feedback processes within museums means that this does not inform digital strategies. Showcasing what prospective customers will see, as is the case with posts about collections, shapes visitor expectations and intentions to visit (Wong et al. 2020; Zollo et al. 2022). Marketing for tourism emphasises getting viewers to inhabit a new imagined reality, one in which they have made a trip or purchase which requires providing sufficient information (Petrova and Cialdini 2008). The writer's adage 'show, don't tell' is useful in understanding this distinction. A post about an interesting story behind an object on display – followed with a link to buy tickets – is likely to result in more purchases than a simple statement saying the museum is open and people should come and visit.

This focus on the experience not only inspires potential visitors, but can improve accessibility. Mantell et al. highlight the role of familiarity in breaking down barriers to first time visitors who are unfamiliar with the venue (Mantell et al. 2024). Removing some unknown variables about the expected experience can help reduce perceived risk, and enables visitors to better plan their trip (Hausmann 2012a; Hausmann 2012b). This is particularly valuable for visitors with anxiety, access needs, or limited mobility. In this way, a small shift in digital strategy to focus more on collections and what audiences will see and do at the museum, can help improve both online engagement and open physical sites to new audiences.

6.1.5 Encouraging Dialogue

Part of the issue with using social media in this way, is that it ignores the more participatory mode of communication – and peer-to-peer interactions – that social media enables, and that had first excited researchers and practitioners (Shirky 2008; Jenkins 2009; Lievrouw 2010). Yet, museums' focus on promotion, has led to prioritising 'broadcast messages rather than conversation' (Kidd 2016; Kidd et al., 2022, 24). This has been a long-term issue in the sector. As Bernhardt describes, by posting advertisements museums 'are falling into transmitter-receiver scenarios that should already have been overcome' (Bernhardt, 2021, 49). Over a decade ago, Fletcher and Lee (2012) found that 60% of their respondents used social media for advertising events, and only 11% claimed to use it for 'dialogic/conversational engagement' (Fletcher and Lee, 2012, 510). Over the last decade, this 'message board' approach to communication has been repeatedly identified in studies of the sector (Gronemann et al., 2015, 187).

However, one of the most interesting ways that museums' communication strategies shifted in the early pandemic, was an increase in multi-directional – or dialogic – forms of communication. March of 2020 saw a dramatic increase in museums' use of the reply feature on Twitter (p. 146). Small museums were particularly likely to adopt replies, developing a more participatory approach to online communities. This presents a marked contrast to the 'top-down' mode of communication museums have primarily adopted on social media (Deodato 2014; Fransen-Taylor and Narayan 2018). It has long been held that this form of dialogue could help challenge notions of the expert, and authority within museums – developing a more 'participatory culture' (Shirky 2008; Jenkins 2009; Lievrouw 2010).

But how meaningful was this dialogue? It is unclear to what extent this shift was seen on other platforms, where a clear delimitation between broadcasting and dialogue and is not embedded into features. Similar trends might be seen in the replies to comments or private messages, which were not captured in this data. Most disappointingly, this shift did not survive museums reopening and dropped to usual levels in July of 2021 (p. 146). The use of replies then, was not a sustained shift towards more participatory practices. In fact, there is little evidence in the large-scale datasets to point to museums adopting a role as a facilitator of discussion or community building online.

This more participatory approach was predominantly focused around informing visitors of museum closures. A close reading of a random sample of these tweets shows that they were often the same reply pasted multiple times. This partially explains why replies fell out of favour in 2021 when all restrictions were lifted

and there was no longer a need to clarify when or if a museum would be open. Therefore, despite museums embracing a more direct form of communication with audiences, this is a far cry from participatory discussions that researchers hoped would be facilitated by the peer-to-peer communication of social media (Shirky 2008).

Museums attempt to facilitate discussion is worth investigating in depth considering the number of statements made emphasising museums' role in their communities, and their ability to bring together and educate the public. With many museums facing permanent closure and seeking financial aid, the statements from advocates emphasised that museums 'have a key role to play in social resilience... [and] are vital for the communities they serve' (Samaroudi et al., 2020, 337).¹⁴⁷ The ICOM statement for relief funds stated that closures would be detrimental to society; they argued 'Museums, as incomparable places of meeting and learning for everybody, will have an important role to play in repairing and strengthening the social fabric of communities affected' (ICOM 2020b). These statements were discussed at length in the literature review, where they were contextualised in the wider political landscape of the past thirty years (see Sections 2.1.2 and 2.2.1). This context – and the fact that the public funding in museums in the UK is historically grounded in their ability to increase civic engagement – helps explain why there is such an emphasis on museums' ability to improve social inclusion and encouraging dialogue between communities (Putnam 1995; Long 2013). Both the need for and demonstration of this role became more acute during the pandemic, which, combined with the prominence of the Black Lives Matter movement, saw many museums actively engaged with their local communities (Crooke 2020; Siddique and Skopeliti 2020; Frost 2021). Elizabeth Crooke (2020) collated the opinions expressed in the forums, newsletters, and zoom meetings in 2020. They summarise the widespread desire to reevaluate museums' value to their communities, 'a consequence of the combined impact of the Black Lives Matter movement, the pandemic, and further austerity on the horizon' (Crooke, 2020, 308).

Yet, while many museums do fantastic work working with local communities through outreach programmes and events, very little of this work appears to have been conducted online. The Black Lives Matter movement is an interesting example. The statue of Edward Colston – and its eventual toppling in 2020 – was a trigger for a widespread discussion online and in the British press about how we discuss and memorialise colonial histories (Siddique and Skopeliti 2020). When

¹⁴⁷Interestingly, the ICOM statement heavily draws on the prevalent legal and medical language that fell into common parlance during the pandemic, describing museums as 'essential', their 'resilience', and their 'healing' role.

discussing the toppling of the statue in parliament – the then leader of the Labour opposition – Keir Starmer argued ‘That statue should have been brought down properly, with consent, and put, I would say, in a museum’ (Walker 2020). The role of museums and public record were central to this debate, yet it was only a minority of museums – generally larger organisations – that were found to actively participate in this discussion (p. 171).

Kidd highlighted the benefits of museums providing a historical narrative to current news stories but emphasises the difficulties and risks museums face when commenting (Kidd 2016). In discussions around the Black Lives Matter movement, Kidd et al. (Kidd et al. 2024) identified the discomfort and frustration of many museum practitioners:

Where interviewees felt such connections were not thoughtful or purposeful, professional and personal discomfort followed: ‘I just got very frustrated and disenchanted with senior management’s just kind of spinelessness ... And it just sort of made me feel like I was on a different value trajectory to the management’. (Kidd et al., 2024, 30)

Yet the study highlights the mental toll this kind of work takes on staff and the abuse that many social media account managers received as a result of being a ‘hyper-visible spokesperson’ (Kidd et al., 2024, 31). It is unsurprising then that the majority of museums have chosen to not to engage (p. 209), however, more research would be needed to understand museums’ many hesitations to engage in these discussions: whether it is a lack of resources, the potential impact on brand reputation, the fear of being perceived as biased, or if there are other contributing factors.

The evidence points to most museums foregrounding positive stories. The news and cultural discussions that were widely posted about were more light-hearted. One participant closely aligned themselves with the statements from ICOM about communities but argued that museums provided an ‘escape’ from the difficulties of the pandemic, casting their role as one of entertainment. This aligns with the findings of Ellie King, who identified that museums online exhibitions were couched in positive language, in the effort to become an ‘outlet of hope and community’ (King et al., 2021, 492). As valuable as this approach may be to museums’ communities, this focus on escapism and entertainment stands in contrast to much of the rhetoric surrounding museums and the value they hold for society.

There is a significant gap then, between what is discussed in conferences and articles, and the experiences of many within the sector. Crooke identified this

issue as early as June 2020, arguing that ‘real change in museums is lagging behind the digital and activist movements documented in museum debates and practitioner conferences’ (Crooke, 2020, 308). Debates around the purpose of museums and how to define them, have highlighted just how disparate attitudes in the sector are, and how contentious the role of museums can still be (Fraser 2019).

6.1.6 The New Normal

The discrepancy between what is discussed in conferences and the reality within the wider sector was most evident in the way museums’ futures were discussed. In 2020, Darren Henley captured the wider sense that things would be different when museums reopened, ‘none of us will be returning to the pre-pandemic world’ (Henley 2020). There was, as King describes, ‘a rising atmosphere of change on the horizon’, and it was seen by many as the opportunity to create and implement a new vision for the sector (Fraser 2019; King et al., 2021, 501). Yet with this potential for change, came uncertainty, and it was unclear what ‘the new normal for culture’ – as phrased by Agostino et al. – would be (2020, 369).

It is true that for some museums, the pandemic has caused a rethink of what the digital can provide, especially amongst leadership teams (Crooke 2020; Kidd et al. 2021; Noehrer et al. 2021). However, the evidence would suggest that for most the sector the ‘new normal’ bears a remarkable resemblance to the old. Museums posting habits have returned to pre-pandemic state, in both frequency, content, and their ‘transmitter-receiver’ approach to communication. As one participant highlighted:

I think social [media] really came into its own with Covid, obviously, but it's completely fallen off now. (P2)

The lack of resources in the sector has, and continues to, define museums’ digital strategies and how they engage with online audiences. The issues of resource scarcity and overworked staff have become more acute after museums reopened, and are struggling with reduced visitor numbers and reductions in government spending.

The discussions of the pandemic inspiring digital transformation have proved optimistic. On-site experiences continue to be the priority, and digital experimentation has ground to a halt as many revert to conservative strategies. As Kajsa Hartig’s prescient article notes:

...as long as the museum is not considering online as important as the exhibition, there will never be enough resources allocated for content, conversation and audience engagement delivered as online experiences. There will not be an incentive to build capacity for more than the marketing of exhibitions. (Hartig 2018)

6.1.7 Metrics

The ineffective marketing strategies of museums have continued in part because organisations have struggled to incorporate feedback and social media metrics into their decision-making processes. Collecting data about online audiences is an increasing priority for leadership in the sector, yet the majority of museums do not measure – through any means – their online engagement (UNESCO 2020; Noehrer et al. 2021).

Developing ways of gathering data and feedback, however crude, is an important step to improving digital strategies. The most accessible and widespread metrics available to museums are simple quantitative measures provided by social media platforms. In the UK, it is more common for museums to have their own Facebook than their own website. Social media uptake is high even amongst small and medium sized museums, making measures of social media engagement – such as ‘likes’, ‘views’, and ‘shares’ – an already widespread form of standardised metric.

These metrics are regularly reported when describing success, and digital teams were proud of their posts with high levels of social media engagement. This was tempered by an understanding that some posts – such as site closures and event advertisements – would not perform well, and that the metrics do not reflect engagement as it is usually described within the sector. However, this nuance is rarely conveyed in the reporting of social media numbers. Annual reports across the sector regularly highlight social media successes. The British Museum highlights that ‘Social media continues to enable us to reach audiences directly’ and celebrates its ‘nearly six million followers across all platforms’ with little elaboration (British Museum 2022). The Linen Hall Library — based in Northern Ireland — was similarly ‘pleased to report that [their Instagram] reached 1,000 subscribers by year end’ (Linen Hall Library 2020). This kind of reporting is understandable as funders actively encourage organisations to use social media channels ‘to show how public funding enables your work and positively impacts the lives of your audience and your local community’ (Arts Council England 2023).

This simple reporting of page views and likes are aptly referred to as ‘vanity metrics’ by Richard Rodgers, exactly because it is questionable to what extent they truly reflect ‘palpable influence’ (Rodgers 2018). The article borrows Jenna Wortham’s description of social media as ‘success theatre’, where everyone competes to present themselves as the most successful, with likes being used to keep the score (Wortham 2012; Rogers, 2018, 452). They are, in isolation, not accurate measures of influence, popularity, or engagement.

Furthermore, the extent to which these metrics can be used for comparison is dubious. Baym (2013) notes that social media metrics’ usefulness is undercut by the fact that social media recommendation algorithms foregrounding some posts over others. As a consequence, the metrics become unreliable; posts that are shown to more people will have higher levels of interactions. This is highlighted in the breakdown of the view count of the two British Museum videos in the YouTube Case Study, which shows the extent to which these metrics are influenced by the way platforms disseminate content (Section 4.17). This severely limits their usefulness in evaluating digital strategies and curatorial decisions.

The difference between what these metrics are implied to indicate – i.e. impact and audience size – and what the processes they actually reflect poses a problem to the increasing adoption of social media metrics as key performance indicators (Brooke 2025). ‘Views’, ‘likes’, ‘click-throughs’, ‘shares’, and the number of comments, are designed to facilitate a certain type of engagement – motivated by commercial interests – that bears little similarity to the type of open dialogue and meaningful participation most museums are trying to facilitate (Gillespie 2010). As Voorveld et al. conclude, ‘information might increasingly be a “by-product” of social media use rather than a central feature’ where exchanging information ‘is a means to an end rather than a goal in itself’ (2018, 51). In this case, the goal is the monetisation of attention.

But are there alternatives? Rogers (2018) suggested network analysis as an alternative to ‘vanity metrics’, but most museums simply do not have the time or expertise to implement these solutions. This is supported by the findings of a report conducted for the Museums Association in 2022 which highlighted that museums with in-house teams were more likely to follow best practices for evaluation. However, they highlight that ‘Smaller museums were less likely to have this knowledge and have more limited capacity’ (Cultural Associated Oxford and One Further, 2022, 10). In addition, an average small museum does not enough data to make any statistically meaningful inferences for just their own account (p. 106). These same issue plague surveys – which are the most flexible tool for most museums – as low return rates result in very limited feedback indeed for smaller

organisations (Dickenson 1992; Chaplin et al. 2023). By collating the data from many organisations, in this research, trends have become apparent that would not be visible within the posts of a single organisation. This thesis therefore aims to provide some guidance for smaller organisations who do not have the resources to conduct similar research themselves.

However, there is one form of feedback that is within the reach of every organisation. In the course of their work, most social media account managers look at comments, basic metrics, and talk to on-site visitors. As highlighted in the literature review, this blend of methodologies – including qualitative, quantitative and longitudinal – forms a robust and well-rounded form of evaluation (Cultural Associated Oxford and One Further 2022). Digital practitioners are well positioned to provide highly nuanced feedback and adjust digital strategy accordingly, yet in many organisations, there are not channels to communicate this to others. Participants highlighted that digital strategies were often top-down, developed by leadership teams who did not have this experience. The efficacy of this was challenged by multiple participants, and the frustration was palpable (p. 219).

Giving account managers more freedom to manage strategy, would help incorporate this kind of knowledge into the design of museums' posts. While there are risks around brand management that leadership teams may want to consider, this could better integrate evaluation into digital strategies, improve levels of online interactions, and job satisfaction (Drotner et al. 2019; Booth et al. 2020).

6.2 Platforms

While there are undoubtedly steps museums can take to improve engagement online, there are a number of factors that are shaping museums' relationship to their audiences which are entirely outside of the control of individual organisations or practitioners. Foremost of these is the increasing reliance on private companies – such as Meta and Google – for digital services such as creating a Facebook account or building a website (Automattic 2022; Meta 2023a). These companies are increasingly shaping the relationship between museums and their audiences.

6.2.1 The Diversification of Audiences

This first emerged in discussions of diversifying museums' online audiences. One of the primary motivations for museums using social media, has been to reach younger audiences (NEMO 2020b; UNESCO 2020; Noehrer et al. 2021). Traditionally within the UK, museums' on-site visitors have been on average older and

wealthier than the general population (Walmsley et al. 2022). Yet, an 18-month survey of the UK cultural sector – conducted by the Audience Agency – found that online audiences broadly mirrored those of museums’ physical sites (Noehrer et al. 2021; The Audience Agency 2021; Walmsley et al., 2022, 68). Digital platforms were found to be better more effective at engaging existing audiences than attracting new ones (Walmsley 2019; Mantell et al. 2024).

But why? The Pilot Study highlighted the obvious – museums generally do not use the social media platforms that are most used by the younger demographic groups they wish to target. The most popular platform amongst museums is Facebook, yet Facebook users are on average older than those found on Instagram, Snapchat, and TikTok (Ofcom 2021). It is on Facebook that museums receive a higher number of interactions on Facebook posts than any other platform, contributing to the fact that practitioners keep an active presence on the site.

However, why Facebook generates more engagement is debatable. Both museum audiences and the Facebook userbase skew older, so there is a likely overlap between avid museum-goers and Facebook users – more so than museum visitors and TikTok. However, there are complicating factors. Facebook was the first social media platform many museums adopted, and some have been using the site for over a decade. As such, many organisations’ broader digital strategies have been heavily influenced by what works well on the platform. Therefore, the types of posts they create have been more heavily guided by Facebook users than TikTok or Instagram users, whose input and feedback are relatively new and infrequent. When museums repost the content of their Facebook posts on new platforms then, they often perform poorly by comparison. This has led many of the participants to primarily focus on Facebook, while they ‘experiment’ with other platforms. While some practitioners adapted posts for the platform it was published on, over a quarter of participants simply reposted the same thing across every platforms. The original site that these posts were designed for was Facebook, whereas each platform has unique communication norms, and engagement is likely to be generated on a different types of content.

However, the primary barrier is the not the content itself, but the fact that audiences must find museums’ accounts, and it is this that museums have predominantly struggled with.

6.2.2 Recommendation Algorithms

Across all major social media platforms – excluding Bluesky –¹⁴⁸ the main way users discover new content is not via search, but through the platforms’ recommendation systems (Zhou et al. 2016). These recommendation algorithms work by suggesting new content to a user, usually through ‘up-next’ videos, or ‘for you’ and ‘discover’ pages. These recommendations are personalised for users based on the data from their account and viewing habits.

However, it is difficult to establish exactly why a certain post is recommended. These systems use ‘black box’ algorithms, and companies like Google and Meta do not share details of how they were trained (Cunningham et al. 2016; Bishop 2018). As a result, academics unaffiliated with these companies are forced to use large-scale data analysis to identify elements of posts that may be prioritised. While these are subject to change, Oscar Alvarado et al. list the most commonly identified features: ‘[user] demographics, video titles, video descriptions, thumbnails, co-watching, or time spent watching a particular video’ are all likely to influence recommendations (Alvarado et al., 2020, 121:20).¹⁴⁹

This has a number of impacts on museums’ online audiences. Firstly, when recommendations are based on users’ previous engagement or watch history, they are more likely to recommend museum posts to users who already engage with other museum accounts. As such, the vast majority of recommendations will be to existing audiences, and not diversifying or expanding who museums reach online. Most large platforms additionally collect – or at a minimum, predict – the demographic data of users in order to more effectively target advertising.¹⁵⁰ This demographic data is also used by recommendation algorithms (Alvarado et al. 2020). Therefore, if an account’s established audiences are older, the recommendations algorithm is likely to recommend it to users in that age range. This is more detrimental to museums’ attempts to reach new audiences, as it reinforces and calcifies the existing demographic makeup of their online visitors.

¹⁴⁸While one of the smaller platforms, Bluesky is notable for its rejection of the mandatory opt-in to recommendation systems. Recommendation algorithms are not entirely absent from the platform, as there is a ‘discover’ page, but the algorithm implemented is up to the user, who can even create and implement their own on the platform, including simpler transparent solutions, such as a ‘chronological feed of who they follow’ (Graber 2023).

¹⁴⁹Notably, Alvarado et al. highlight these feature in particular as, despite being well-documented in the academic literature, users were unaware this information was used to inform recommendations (2020, 121:20). However, the majority of participants were aware of the role of recommendation algorithms, and that their watch history was used as data for recommendations.

¹⁵⁰Google products – such as YouTube or Gmail accounts – enable you to see what gender and age their algorithm has tagged your account as through the ‘My Ad Center’ page. This data sharing feature can be paused through disabling ‘personalized ads’ in ‘My Ad Center’ (Google Support 2025b; Google Support 2025a).

6.2.3 New Gatekeepers

These recommendation algorithms have become a mediator between museums and their online audiences. As Arnaboldi and Diaz Lema concluded in their study of Italian Archaeological museums, ‘the platform itself also determines the rules of dissemination, and the percentage of followers who are shown the material may vary continuously’ (Arnaboldi and Diaz Lema, 2021, 12). The recommendation algorithms are liable to change with no notice (Meese and Hurcombe, 2021, 3). As one platform savvy participant noted: ‘just because you understand it one week, doesn't mean that you can apply the same knowledge the next’ (P5). For those who are trying to reach new audiences, identifying and adapting posts to these changing targets can absorb an enormous amount of time.¹⁵¹

The other difficulty this poses, is that museums may conflate adapting their content for their audience – which is considered good practice – with adapting their posts for recommendation algorithms. If audiences stop engaging with certain types of posts, staff may assume this is because their audience is no longer interested, and not realise that their content is not being shown to their audience because the platform is ‘pushing’ a different type of post. Agostino and Diaz Lema aptly summarised the dilemma: ‘Do museums provide what they think is better for users or what engages users better?’ (Agostino et al., 2021, 70). Some museums have tried to reach a compromise. Sarah Bell described adopting a ‘80/20 rule. Eighty percent of the content focused on participating in trends and engaging with the TikTok community, while the remaining 20% delved deeper into educational topics’ (Richardson 2024). This strategy was specifically designed to maintain the museum’s visibility and reach on the platform while still fulfilling its educational aims. To reach new online audiences museums must strike a balance between creating texts that meet their organisational aims and those that meet the unspecified criteria of social media platforms.

In this way, the recommendation algorithms – and by extension the companies that own them – have become mediators between museums and their audiences. While this role may once have been held by editors and television producers, today, the introduction of algorithmic curation of posts has introduced new barriers to publishing online (Williams and Delli Carpini, 2000, 61; Vos 2015). As Ralph Schroeder highlights, on social media ‘the way that content is tailored to audiences via search engines means that there are new gatekeeping mechanisms’ (Schroeder, 2018, 324).

¹⁵¹This is especially true as frequency of posting was widely identified as a major deciding factor of whether something was shared by the algorithms (p. 223)

This is particularly important due to the difference in the goals of these companies and those of museums. For the most part, the priority of these companies is increasing the amount of time users spend on the site. In 2023, Meta saw their largest profit in years, which they attributed to an increase in the amount of time users were spending on Facebook and Instagram, which increased by 6% and 7% respectively (Meta 2023a; Paul 2023). Mark Zuckerberg attributed this increase to ‘recommendation improvements’, which consequently increased the company’s advertising revenue (Paul 2023). This sharply contrasts museums’ educational and community-driven goals. David Berman’s prescient paper highlighted the danger to museums, who he warned ‘will be squeezed out of the Global Information Infrastructure (GII) by a commercial content that embodies very different values from our own’ (Bearman 1995).

6.2.4 The Problem of Negativity

Nowhere is this more evident than the way recommendation algorithms have been criticised for increasing political polarisation (Kubin and Von Sikorski 2021), spreading misinformation (Allen et al. 2024), and negatively impacting mental health (Glaser et al. 2018; Braghieri et al. 2021; Popat and Tarrant 2023).¹⁵² On Facebook, highly emotive posts are more likely to be shared – and spread further across the platform – an effect that is stronger for posts that inspire negative sentiments (Ji et al. 2019).

This is seen clearly in the large dataset of Facebook posts where the most shared posts were dominated by war, conflict, and animals in distress (p. 174; Appendix E). Various examples have emerged throughout this research that typify the trend seen in the data: a contentious art installation generating comments (p. 175); incorrect details about trains angering users (p. 232); and a theft leading to divisions within a community (p.233). Consistently, posts about thefts, controversy, deaths, and conflict, are far more likely to see high levels of interaction. It is these posts that are most widely shared on the platform, and the most likely to be seen by people who do not already frequent museums. How might this then change the public perception of the sector?

¹⁵²The research on political polarisation is increasingly divided. While there had been a consensus, a recent study by Andrew Guess et al. (2023) argues that the impact of social media on political polarisation has likely been overstated. It should be noted that this argument is relative, and they do not argue that social media does not contribute to polarisation at all, just less than previously expected in the 2020 election. However, this paper is highly contentious, as during the period of data collection Facebook implemented emergency measures to reduce the amount of misinformation and inflammatory content on the platform (Kupferschmidt 2024).

The data shows time and time again that museum posts can contribute – even inadvertently – to stoking conflict. Therefore, while it is tempting to conceptualise museums as using these platforms ‘for good’, it must be acknowledged that museums’ use of social media also contributes to many negative effects these platforms have. While it could be argued museums can help combat misinformation and educate the public through these platforms the majority of museums cannot fulfil this role – either because they do not have the means, leadership buy-in, or expertise. Social media platforms are not designed to facilitate empathetic discussion about complicated and nuanced histories at scale, and an attempt to do so – if not properly managed – may further stoke controversy and political divisions.

6.3 Looking to the Future

6.3.1 New Audience Behaviours

It is worth thinking deeply about the impact that these systems will have on the relationships between museums and their audiences, as they are only becoming more prevalent. This is especially true amongst younger audiences who Amelia Hassoun et al. found to have a ‘preference for algorithmically-tailored information sources’ (Hassoun et al., 2023, 6). In 2022, a Senior Vice President at Google, Prabhakar Raghavan, mentioned offhandedly that ‘In [Google’s] studies, something like almost 40% of young people, when they’re looking for a place for lunch, they don’t go to Google Maps or Search... They go to TikTok or Instagram’ (Moreno 2022; Raghavan 2022). The data underlying this statistic have not been published, but it points to the increasing prominence of ‘social search’ (Westbrook 2025). This trend sees users rely heavily on their social media networks to find trusted information rather than turning to Google. As Hassoun et al. highlighted, ‘Many [young users] felt that they would naturally *encounter* truly important or personally relevant information, rather than needing to search for it’ (Hassoun et al., 2023, 6). This reliance on algorithmically curated content – either through social media or now ChatGPT (Choudhury and Shamszare 2023; Karunaratne and Adesina 2023; Westbrook 2025) – will only become more prevalent in the future. To what extent this will impact website or on-site visitor numbers is yet to be seen, but it is a shift that the sector is poorly prepared for.

The practitioners interviewed in this research were already overwhelmed by trying to adapt to existing recommendation algorithms. Optimising posts or websites to be ‘pushed’ is both time consuming and requires extensive digital expertise. As

these black box algorithms become more prevalent in the way we look for and find information, museums are at risk of becoming more difficult to find online.¹⁵³ This has already been seen to some extent with the ranking of search engine results (search engine optimisation or SEO), as many museum websites are already difficult to find (p. 66). A common solution to this issue has been outsourcing the task to third-party companies. Today, Wix, WordPress, and Squarespace, all have in-built features to improve a page's ranking on Google and get a website to the top of the search results (Squarespace 2025; Wix 2025b; WordPress 2025b). It may be that future third-party services offer similar 'AI search optimisation features'.¹⁵⁴

6.3.2 Reasons for Optimism

Yet, despite the prevalence of recommendation algorithms, a few exceptions have emerged over the course of this research that highlight both simple techniques to reach large audiences, or alternative ways for people to find museums online. The success of transport museums, highlighted in the Population Study and Interviews is of note. By tapping into existing online communities, focusing on the collections, and relying on nostalgia, these posts outperform the sector average. These posts do not necessarily go viral, but have consistently high levels of interaction. This represents the levels of interaction museums are able to achieve without resorting to a dramatic modification of their posting strategies. There is, amongst these posts, a high level of in-depth engagement, with personal recollections and memories littering the comments. This is the closest the social media comments within the dataset came to the types of thoughtful engagement most museums were trying to foster.

By shifting away from advertising in-person events, even small museums were able to reach significant international audiences during the pandemic. As Mantell et al. highlight, 'many organisations were delighted to find new niche audiences in far-flung places across the globe' (Mantell et al., 2024, 107). This was particularly clear within the example of Scottish museums and the engagement with the

¹⁵³Of course, search and retrieval tasks, such as finding relevant websites through search engines, have been driven by neural networks since 2018 (Google 2025a). Nevertheless, recent changes to these systems – including a shift towards increasingly personalised algorithms – will likely exacerbate this trend.

¹⁵⁴This is already a widespread discussion in marketing and is likely to grow in prominence as using ChatGPT for search becomes more common (Karunaratne and Adesina 2023; Xu et al. 2023). As the process of ranking becomes better understood, the integration of common solutions will likely emerge in the same way as previous search algorithms, whether that is 'helpful tips' as you design a site or post, or more involved back-end solutions (WordPress 2025a). In addition to automated indexing on the relevant sites such as Bing and Google, this can include the creation of automatic sitemaps, SSL certificates, and structured markup (Squarespace 2025).

diaspora, which highlights that these audiences can be monetised both in on-site tickets and through online events.

Of course, some may criticise the fact that this level of engagement is primarily found amongst those with a personal connection to a given place or object. However, when working away from recommendation algorithms audiences need to have a motivation to seek out a museums' post or website. This can either be achieved through traditional advertising, word of mouth, or during their own research. As Anna Ward noted after the first national lockdown, 'We knew from our research that we needed to try to put our content online in locations that our intended audiences might already visit, rather than expect them to come completely cold to a new site' (Ward 2020).

In order to broaden digital audiences, much of the same logic that informs on-site outreach initiatives would be applicable online communities. This digital component is not geographically restricted, so the number of organisations and communities a museum could reach out to is significantly larger. As ever, the primary barrier to such initiatives would be finding staff time. However, museums could collaborate with charities and other organisations to inform online visitors of resources, upcoming digital events, or new projects. By beginning a dialogue in this way, museums could significantly enhance the interpretation of their collections and the stories they tell. While time consuming, this is a more reliable – and perhaps more comprehensible to many practitioners – approach to building online audiences. Despite not resulting in the same 'vanity metrics', it is arguably more likely to result in meaningful engagement than the rare viral successes that are 'pushed' by a recommendation algorithm.

There are then, a diversity of approaches museums can take online. While the increasing prevalence of recommendation algorithms poses a number of problems for the sector, there are still strategies independent of these systems that museums looking to diversify their online audiences can explore.

Chapter 7

Conclusion

7.1 Summary

The research set out to explore four key research questions:

1. How did museums in the UK adapt to the perceived increased demand for online experiences resulting from the outbreak of Covid-19?
2. (How) has museums' online offerings changed during the course of this research (2020–2025) and how was it received by audiences?
3. What are the main obstacles, necessary resources, and parameters of success for museums publishing online?
4. Looking to other fields, can the methods for evaluating online experiences be improved upon?

In doing so, this thesis has corroborated much of the survey and interview data gathered over the course of the pandemic and has provided quantitative evidence of trends already identified by museum practitioners. Yet, it is the discrepancies between the results and widespread narratives – in both news article, conference, and previous studies – where the advantage of this large-scale approach becomes evident. By addressing the bias towards large museums – who make up less than a third of the sector – this research has been able to highlight under-represented digital strategies and experiences.

7.2 Key Findings

7.2.1 Online Engagement

As a result, it has become clear that many of the claims made of digital technologies by and advocates in the sector are optimistic. The claims of improving visitor numbers, reach, and the diversities of audiences are not supported by the data. The vast majority of museums lack the time and expertise to reach new online audiences and see low levels of interaction across most social media platforms. The widespread use of these platforms for advertising, has likely had a negative impact on the size of audiences and levels of engagement. More disappointingly still, there is little evidence to suggest that this strategy has increased ticket sales.

Through the analysis of over 1,450,000 Facebook posts and 3,250,000 tweets, this research has highlighted a number of different strategies that result in higher levels engagement online. These include focusing on stories from the collections, strong personal narratives, and posting about events and objects within living memory.

7.2.2 Barriers to Success

Yet, in order to achieve this, digital practitioners need the time to create posts, gather feedback in the form of metrics and surveys, and develop their own skills. Despite claims that the pandemic transformed attitudes towards the digital within the sector, participants reported that there was a systematic undervaluing of their expertise, and there was a lack of understanding as to the time and effort required to reach large audiences online. A small handful of success stories appear to have contributed to the idea that anyone can do well on social media and that it is ‘free’ for the museum. This combined with the overwork of practitioners and their adoption of multiple roles, has led to many who have developed digital expertise leaving the sector for more lucrative and stable roles elsewhere. This problem particularly plagues small and medium sized museums who account for the majority of organisations in the sector (70%). It is these organisations that would need to be the focus of future campaigns which hope to improve digital skills in the sector.

However, there is another sizable barrier facing many museums. In evaluating different methods of measuring engagement, this research has highlighted the role that ranking and recommendation algorithms play in the size and diversity of museums audiences. Audiences do not just ‘discover’ museums content by

themselves. In order to reach new users, museums are required to deftly navigate the ever-changing demands of platforms' recommendation systems. The large companies that build these systems have different – and occasionally conflicting – priorities to museums. Museums' posts that are more upsetting and controversial – including those that sparked divisions within communities – are more widely disseminated. This could have an impact of the perception of these organisations, and has raised the question of whether public, charity, and cultural institutions are served well by privately owned platforms and third-party content management software.

For many, it may be that the high cost of social media – so often conceptualised as 'free' – is not worth the results it brings. And for these organisations, the real question is how else they might facilitate engagement with online audiences and local communities.

7.2.3 Museums During the Pandemic

Focusing on the pandemic, the predicted digital transformation of the sector has yet to materialise (Art Fund 2020; Crooke 2020; Noehrer et al. 2021). With limited resources and smaller audiences after the pandemic, museums have refocused on their on-site visitors at the expense of the digital. While there was an initial burst of activity in the first lockdown period, by 2022 the number of uploads to social media platforms were similar, if not slightly lower than 2019. The increase in posting did not result in larger online audiences for museums or more interactions on their posts, and in 2025, the digital footprint of the sector looks remarkably similar to 2019. This is unlikely to change in the near future, as digital practitioners have been asked to take on additional responsibilities as sites reopened and lack the time to experiment with new digital strategies.

However, the pandemic did see many museums experiment with uploading videos, hosting live events, and monetising online audiences. While the majority of these initiatives came to a halt when museums reopened, they highlighted a demand amongst online audiences for this type of digital experience, and a willingness to pay. This highlights a future avenue for museums to explore.

7.3 Limitations

For all of the ways that this research has expanded our understanding of the museum sector, its limitations – as unavoidable as they may have seemed – are

numerous. In attempting methodological transparency, these limitations, and the decision-making process behind them have been included at every stage. From the exclusion of unaccredited museums in the first studies (p. 71), to the choice of parameters when training neural networks (p. 107), the use of ‘vanity metrics’ (Rogers 2018; p. 26), the error rate of the pipeline (p. 92), and the use of black box models (p. 107), each has been discussed in both the methodology and results. The mixed methods approach was in part adopted to mitigate the drawbacks of the many digital methods used throughout this thesis. Therefore, instead of reiterating these limitations, this section will focus on the ones that I think have most shaped the direction of this research.

7.3.1 The Inclusion of Audiences

The one main omission which I would – given the opportunity in the future – address, is the lack of inclusion of audiences in this work. As highlighted in the methodology (p. 103), the inclusion of comments poses a difficult dilemma to researchers following AoIR or NESH ethical guidelines (AoIR 2019; NESH 2024). Comments can contain special category data – information such as ethnic origin, political opinions, and sexual orientation – which requires more careful handling and a different set of procedures. Such procedures would be complicated further by the fact that it would be unclear which type of special category data the comments would contain until after the analysis, requiring researchers to make the assumption that all were within in the dataset. While some researchers have worked around this by manually summarising comments, this is not feasible at a large scale (Waller and Waller 2019). While other, often older studies, have ignored this issue entirely, and some projects have analysed comments without mentioning these ethical concerns.

For researchers who need to store these comments – as would be necessary for digital forms of analysis – simply removing the commentor’s profile metadata does not necessarily result in anonymisation. Commentors often refer to themselves, their location, friends, and family, making them easily identifiable. Furthermore, if an account’s activity is included – as might be the case to better understand user behaviours, or which types of users are likely to be shown a post – the risk of deanonymisation is high (Su et al. 2017; Rüdian et al. 2018). Therefore, the majority of audience data gathered through social media that is valuable to museums – demographic information, user journeys, comments etc. – is difficult to handle in an ethical manner.

The result is that most research on museum audiences adopt surveys, where par-

ticipants are able to give their express consent for their data to be used in the project. The Cultural Participation Monitor is the largest such example in the UK museum sector and has been used throughout this thesis to contextualise the results. However, as the Participation Monitor covers the entirety of the arts sector, less of the results are directly applicable to museums than had been anticipated at the outset of the project. While it would be inadvisable to try to replicate an 18-month project that surveyed 6,000 participants, a small, targeted survey that followed-up on some of the findings of this thesis may have provided more insight into audience behaviours around commenting, sharing, and the popularity of certain subjects. Unfortunately, soliciting a large enough number of responses and creating a representative sample would have required a significant workload that was not achievable alongside the analyses presented here.

7.3.2 A Lack of Images

Considering how central images – and increasingly videos – are to the success of a post, the other major limitation of this work is the exclusion of the images and videos within posts (Li and Xie 2020). The method used on the website screenshots – and other computer vision tasks – would have complimented the textual analysis. It could be used to highlight categories of images and compare levels of interaction they generate. For example, the interactions with photos of landscapes could be compared to photos of people, and so on.

However, as images were not captured in the Mapping Museums social media datasets utilised in the Population Study, to add these new forms of media would require the data gathering step to be redone in its entirety. With the closure of CrowdTangle and increasingly stringent rules on access for Meta platforms, this would have been a large undertaking within the final year of the PhD. In addition, the sheer quantity of images, especially if videos were included, would require special storage arrangements within the university and potentially additional funding for API requests.

Both of museums online audiences and use of images would benefit from further research.

7.4 Future Research

In addition to these two areas, the thesis has highlighted a number of promising avenues for future research. These have been clustered in three overarching top-

ics: digital humanities methodologies; museum websites; and recontextualising on-site visits.

7.4.1 Digital Humanities

As discussed in Section 3.11, this research has highlighted an issue regarding methodological transparency around common approaches in the field. There are two avenues for further exploration which may lead to solutions for this issue.

The first would be to help researchers better visually communicate the uncertainty inherent within the visualisations of these models. A potential for implementing this kind of visualisation is described at length in the methodology (p. 107). The idea for this work has been born of collaboration across the international digital humanities community and would be highly relevant to the growing number of projects, in both the digital humanities and computer science, that are interested in improving the transparency of training models.

However, there is another alternative. The gold standard to evaluation of models is human-labelled data. This is usually not considered possible for neural topic modelling, as the number of topics is not predefined, so it is unclear what schema would be useful for labelling. For example, it is unclear whether a tweet about trains be in a broad ‘transport’ topic or a smaller ‘railways’ topic. However, this issue is also faced in computer vision tasks, and the solution could be adapted to create a new form of evaluation for topic models (Wang et al. 2014; Bast et al. 2015). The technical details of this new approach are described in the methodology (p. 107). While it would require a significant time investment to develop the labelling tool, it has the potential to transform the way models are trained and evaluated across a broad swathe of digital humanities projects.

7.4.2 Museum Websites

The questions this thesis has prompted about the museum sector are a more direct continuation of this research. Due to time constraints, the number of digital methods used on the website dataset were less varied than those used on the social media posts. As such, there are a number of different approaches that could be applied to the website data to further expand our understanding of what museums are doing online. Analysis could be conducted of the website text, but this data could also support the exploration of how museums have used both collections databased and virtual reality applications. With the html archived, it is relatively simple to identify where these technologies have been implemented.

This would enable researchers to further explore to what end these technologies are used and identify innovating institutions and collaborators.

Ways of searching online collections interfaces pose a particularly interesting conundrum for museums. There is a growing disjoint between how search functions in our day-to-day life – which is supported by large language models (LLMs) that handle natural language queries – and the key-word search often used by museums. This difference is obscured in many interfaces, which all adopt a simplified search box that resembles the google homepage. This simplified design – while not intimidating – does not give any indication of how the search works, or that it is indeed different from most other search boxes users encounter. Bearing in mind that museum collection searches often do not return plurals, a user may incorrectly assume something is not in the collection, when it was simply not returned by a particular search. It is also possible, that the way search works can be brought more into line with users' expectations through the implementation of LLMs. However, implementing natural language search has a high technical threshold, and adopting these black box algorithms may introduce new biases into the online experiences. For example, it may be more likely to return famous objects – those that are an established part of the western canon – than those created by lesser-known artists. To explore the biases introduced would require an exploration of the ranking algorithms

This is less of a problem when an online collection consists of a few hundred, or even thousand objects that can be reviewed by a single individual. However, as museums increasingly adopted shared infrastructure to host their online collections, these databases now consist of millions of items. Therefore, what objects are returned and the order in which they appear has the potential to shape an individual's perception of what exists in the collections and the wider historic record. To explore the biases these digital platforms introduce to research, would require an investigation into the most commonly used search and ranking algorithms and which items are most likely to be returned in a given search (Kizhner et al. 2021).

7.4.3 Museums On-site

This research has highlighted the lack of evidence around a simple question. Does posting online increase on-site visitor numbers? There is a surprising lack of robust evidence to suggest that this is the case. The main problem is that a single institution does not generate enough data – or have a large enough audience – to identify statistically significant trends. This research would therefore require

the close collaboration with a number of different museums willing to share their ticketing and social media data.

Another avenue of research was opened by the work on recommendation algorithms, which has prompted the question of how museums can build online audiences and communities without relying on these systems. If museums were to move away from social media, is there a feasible alternative? Community building is the mainstay of outreach teams, and it would be an interesting avenue of further research to explore how applicable and effective these practices are in the digital landscape.

7.5 Contributions to Knowledge

Cumulatively, this thesis has relevance to a broad spectrum of research areas, with a primary focus on the cultural sector and the digital humanities. The findings of this thesis have been presented in a variety of formats including museum conferences, a short film, a podcast, and covered in an Austrian national newspaper. It has also led to four peer-reviewed academic articles, which resulted in numerous collaborations across the sector. However, the key contributions of my research are:

- A representative analysis of the UK museum sector – addressing the bias towards large institutions in the existing literature.
- The collation of both quantitative and qualitative evidence highlighting the impact of private companies’ policies and decision-making on the reception of museums’ posts.
- The creation and preservation of multiple human-validated datasets on the UK museum sector and their online publishing practices.
- A new method for data gathering to create more representative datasets within the cultural sector.

Each of these are detailed below, alongside their use in upcoming research projects and some potential future applications.

7.5.1 Representative Analysis

This research has made a wide variety of contributions to our understanding of UK museums’ response to the outbreak of Covid-19. By combining methodologies,

the thesis presents a comprehensive overview of museums online. It has nuanced the narratives about digital technology that emerged during the first lockdown, which were dominated by the experiences of large and accredited museums. The representative data gathered through this research highlights that there was no great digital transformation; museums faced many of the same barriers as before the pandemic but have even fewer resources with which to address them.

Ultimately, for those who wish to pursue large audiences on social media, this research highlights a number of digital strategies that are likely to result in more interaction and larger online audiences.

As such, the applications of this research for the UK museums sector are evident. Its aim is to inform practitioners, improve best practice, and highlight barriers and issues that museums are likely to face in the near future. To this end, a summary of the findings will be shared through museum associations and popular newsletters.

7.5.2 Platform Infrastructure

Yet, this work has also highlighted a number of trends whose application extends far beyond the pandemic period.

Most notably, it presents a substantial body of evidence that highlights the extent to which recommendation algorithms dictate who will see museums' posts. These ever-changing systems reward frequent posting, uploading videos, and controversy – elements that are either difficult or undesirable for museums to pursue. More detrimentally, this thesis has highlighted that the way these systems work likely inhibits museums' attempts to reach new audiences online.

In addition to the applications within the museum sector, many of the same concerns are of equal relevance to public institutions and charities, as the many drawbacks of using social media are also applicable to the broader governmental and non-profit sectors.

7.5.3 Human-validated Datasets

Looking beyond policy to further research, this thesis has also resulted in two human-validated datasets that will help address the bias towards large institutions in future academic projects. As highlighted in the literature review, the reuse of unrepresentative datasets has led to the perpetuation of existing biases (p. 44). By making this high quality data freely available, this work helps future projects easily correct these biases. The website dataset has already proved of value

to other researchers and has been incorporated into a second academic project exploring the spread of virtual reality applications in the cultural sector.

The datasets also acts to preserve the otherwise ephemeral digital publishings of museums and, at the end of 2025, will form a curated collection within the British Library's web archive.

7.5.4 Critical Approaches to Digital Tools

The contribution of this thesis extends beyond its outputs, and the methodology has highlighted a number of limitations with common approaches used within the digital humanities. The use of neural networks, both for computer vision and topic modelling, highlighted the lack of methodological transparency in the wider literature around optimising parameters and the extent to which it can impact outputs. The details of this technical problem are outlined in Section 3.11. After being presented at an international digital humanities conference, two potential solutions have been identified and are now in development (p. 107).

7.5.5 A New Pipeline for Data Gathering

However, arguably the biggest contribution of this thesis is my method for data gathering. In building this dataset, I have developed a pipeline to identify unaccredited and poorly documented museums. While in this thesis it is applied to the UK, this choice was informed by the availability of data about the museum sector in the country, and the UK has been used as a validating dataset to test the success and difficulties of scaling up this pipeline.

Doing so would address the lack of data available across the global museums sector. Most states do not have a list of all museums, or cultural heritage institutions, within the country. While many have an accreditation scheme of some kind, this represents – like in the UK – a fraction of the true sector. As such the official size of the museum sector in most countries are rough estimates. Preliminary – and conservative – tests using my pipeline indicate that UNESCO reports underestimate the size of the South American museum sector by almost a third (UNESCO 2020).

The ability to accurately map cultural heritage institutions in a given region would help inform both policy and funding, and ultimately aims to help preservation efforts, as without sufficient documentation these collections are at risk. As the Mapping Museums team highlights, when museums close, their collections are often sold with little fanfare Mapping Museums Lab 2025. By recording museums

more accurately, it becomes possible to support museums that may be struggling and identify when items of historic value are going to be sold into private ownership . This endeavour would be a highly impactful avenue for further research.

7.5.6 Concluding Remarks

The findings of this thesis have the potential to transform both museums' approaches to online communications and the way they are researched. Yet, any resulting change in practice will undoubtedly be slow. The scarcity of resources in museums, combined with the complexity of government and funding policies, means that research findings – no matter how compelling – will not transform the sector. Instead, this thesis is the beginning of a conversation: with museums, councils, funders, and other researchers. It therefore builds a strong foundation of evidence to inform the wider debates around the role of museums in the UK and their relationship to the public.

Appendix A

Lexical Complexity

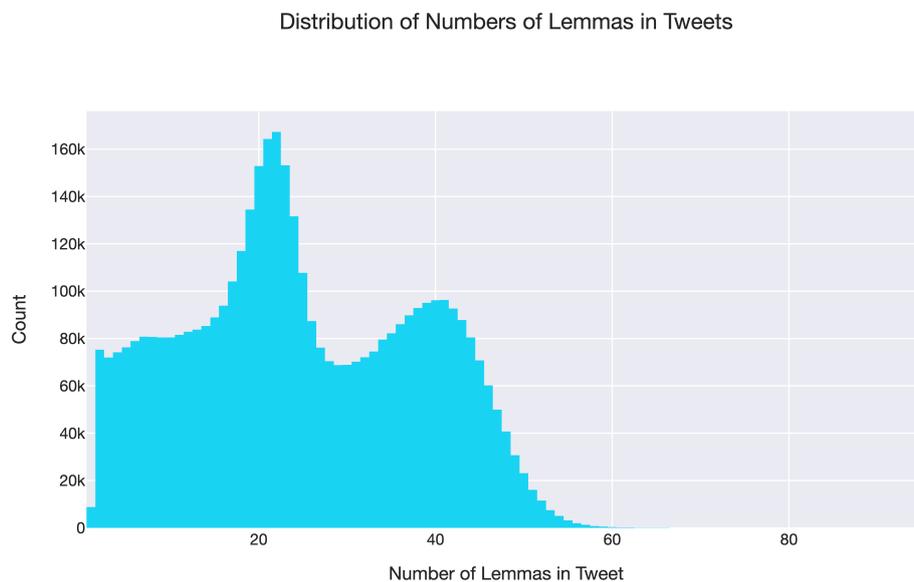


Figure A.1: Distribution of the number of lemmas in tweets.

For this social media dataset, the type-token ratio was a poor measure as it tends to lower as the length of texts increase (Treffers-Daller et al. 2016); as Fred Zenker and Kristopher Kyle highlight, ‘many commonly used [lexical diversity] indices are sensitive to text length and may conflate lexical breadth and fluency’ (2021, 1). Yet the literature investigating which measures are best suited to short texts has varied results. Zenker and Kyle found that the Moving Average Type-Token Ratio (MATTR), Hypergeometric Distribution D (HD-D), and Measure of Textual Lexical Diversity (MTLD) were more stable at different text lengths than other commonly used indices such as Type Token Ratio (TTR), and Corrected Type-Token Ratio (CTTR) (Zenker and Kyle, 2021, 8), whereas Phillip McCarthy and Scott Jarvis

Distribution of Numbers of Lemmas in Facebook Posts

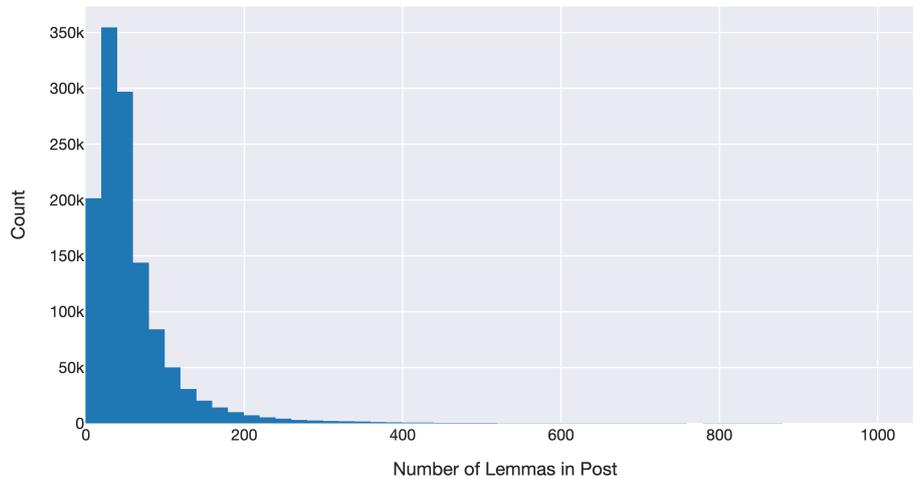


Figure A.2: Distribution of the number of lemmas in Facebook posts.

Changing Text Length of Publications (2019-2022)

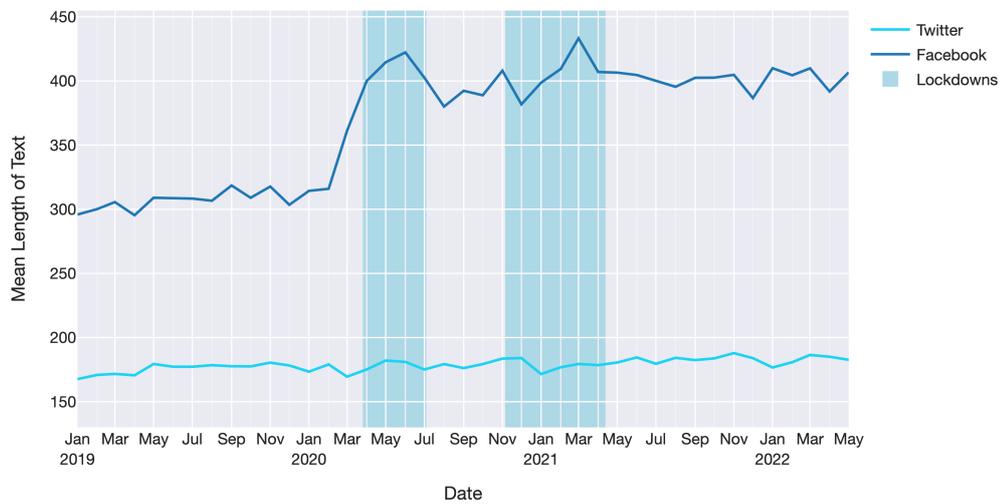


Figure A.3: Average length of Facebook posts and tweets each month (01/2019 to 05/2022). Notably the average here is calculated as the mean because of the normal distribution of post length.

found that MTLD was the only measure that did not vary as a function of text length (McCarthy and Jarvis 2010).¹⁵⁵

¹⁵⁵While this is undoubtedly, a large number of acronyms, a full description of the foundations of

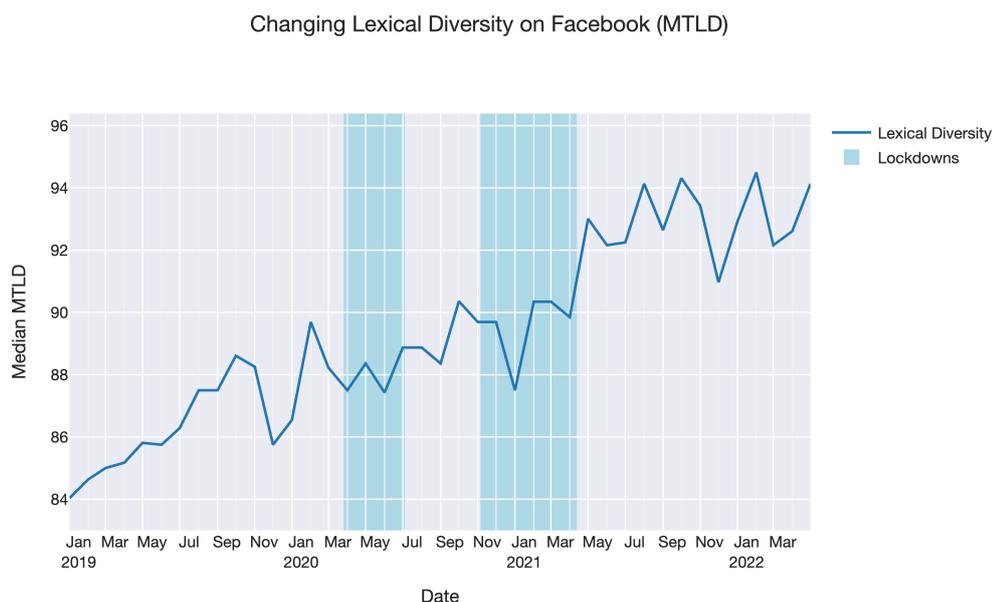


Figure A.4: Median MTLD of posts each month on Facebook.

In order to investigate the complexity of the language used in posts, the lexical-diversity python package was used to lemmatize texts (Kyle 2020). The pipeline was refined to remove URLs, hashtags and emojis, as these unique strings inflated the complexity of posts. After conducting initial testing comparing the length of posts against the change in lexical diversity of different approaches (including HD-D, MATTR, and MTLD), MLTD was chosen as it proved to be the most robustness to text length, aligning with the findings of McCarthy and Jarvis.

Interestingly, it appears that during the pandemic museums also shifted to writing significantly longer posts – with the average length of Facebook posts increasing by a third (Figure A.3, dark blue). There was not a similar shift on Twitter, with no clear mark of the first lockdowns, although there is an upward trend in tweet length (Figure A.3, light blue). Unsurprisingly, the collection of Facebook posts were on average significantly longer than tweets – likely a hangover of the 140-character limit of tweets, which was only extended to 280 in 2017 (Reimann 2023).¹⁵⁶

In order to explore whether this increase in length of Facebook posts was indicative of museums connecting in new ways with their audiences, I also explored

natural language processing are beyond the scope of this thesis. It is far less central to the results than statistical concepts, and the presence of a word limit resulted in these explanations being prioritised. However, an extensive and clear introduction is provided in the textbook *Speech and Language Processing* (Jurafsky and Martin 2025).

¹⁵⁶This also likely accounts for the dramatic difference in the distributions of the number of tokens for posts across the two platforms (Figures A.1 and A.2).

lexical complexity. Unfortunately, measures of lexical complexity are sensitive to the text length. Considering this variance, MTLTD was chosen as a measure for lexical diversity that was robust against text length, and especially appropriate for short texts (Zenker and Kyle 2021; Koizumi and In'nami 2012; McCarthy and Jarvis 2010). However, it is somewhat affected by text length when a text is shorter than 200 tokens. This is the case for the vast majority of posts on Facebook and all Tweets (Figures A.1 and A.2). As a result, the analysis of the tweets (on average 21 lemmas long), closely followed the changes in length and was discarded. However, the Facebook posts were on average twice as long (with a median of 42 lemmas), and the MLTD proved more robust. Figure A.4 shows a gradual increase in lexical diversity in the posts over time.

While not significant, combined with the changing content of posts it is possible that this increasing complexity is indicative of a wider shift in museums' communication strategies. This is most likely reflective of a shift away from posting about events and towards highlighting stories within the collection.

Appendix B

Posting Frequency

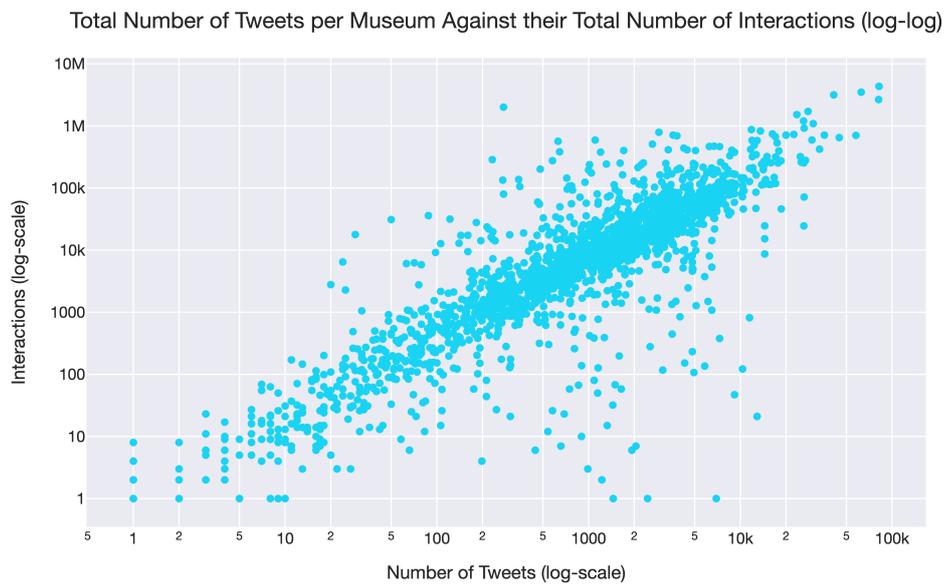


Figure B.1: Total number of tweets of each museum, shown against the total number of interactions that account received (log-log).

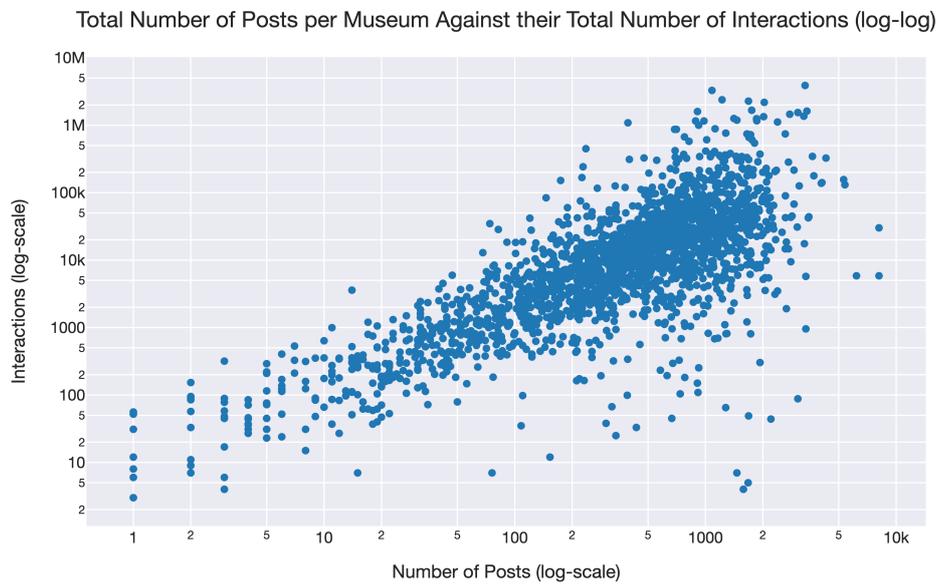


Figure B.2: Total number of Facebook posts of each museum, shown against the total number of interactions that account received (log-log).

Appendix C

Topics Over Time

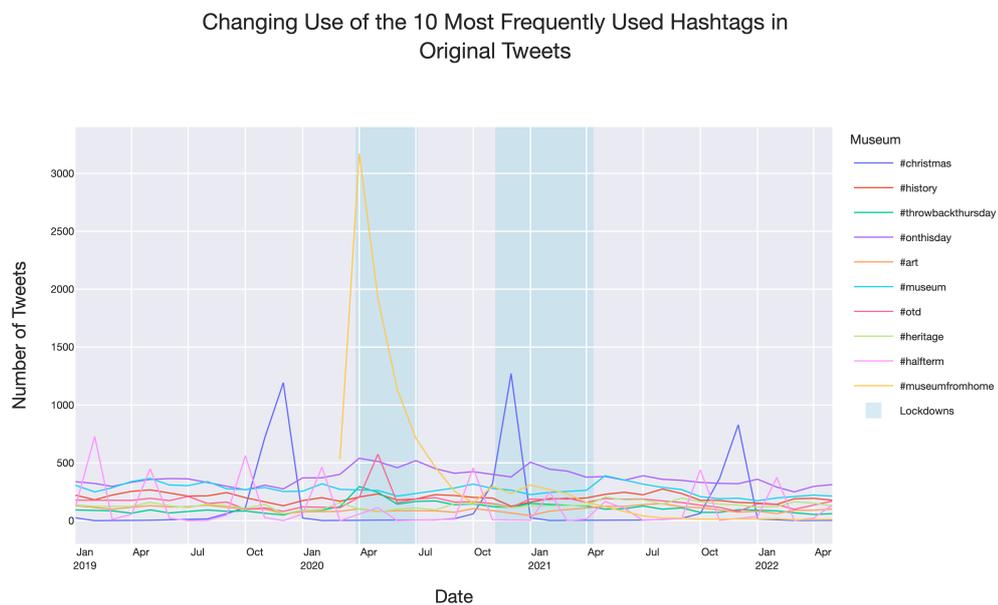


Figure C.1: Changing use of the 10 most common hashtags in the dataset (excluding replies and retweets).

Figures C.1 and C.2 highlight the top 10 most commonly used hashtags over the three years, charting their changing usage in that time. There is a clear spike in the first lockdown period of with #museumsfromhome being used 3,112 times in April of 2020. This drops before the first UK lockdown begins to loosen in June of 2020, but rose by a small amount in the latter half of 2020 when restrictions were reintroduced. The hashtags #museum and #heritage are regularly used but did not see any particular upswing in usage during the pandemic, while #onthisday and the shortening, #otd, saw small peaks during the first months of lockdown. The seasonal spikes for #christmas and slightly smaller spikes for #halfterm are

C. Topics Over Time

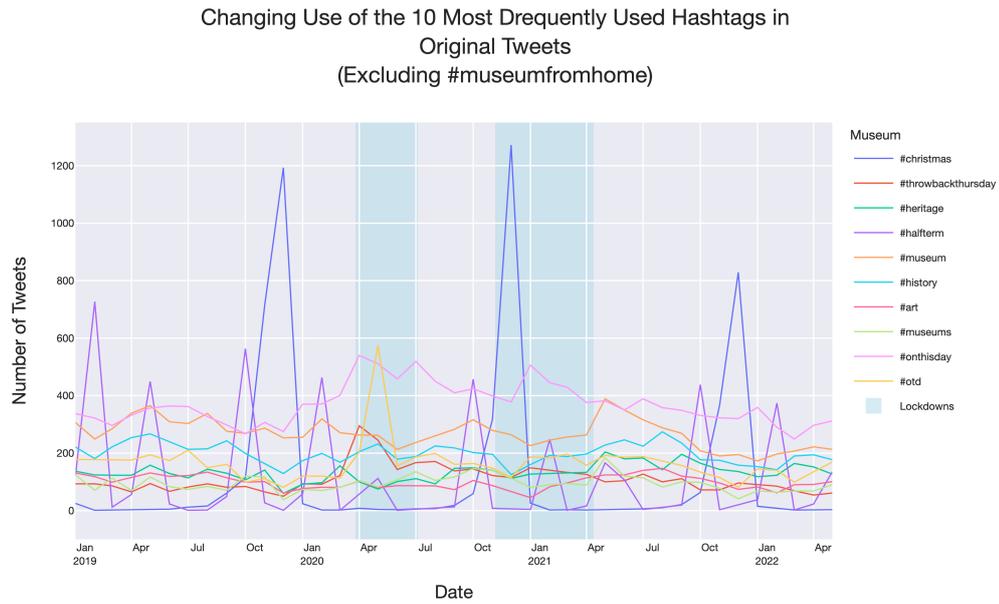


Figure C.2: Changing use of the 10 most common hashtags in the dataset (excluding replies and retweets) with the #museumfromhome hashtag removed.

incredibly consistent throughout the sampled period.

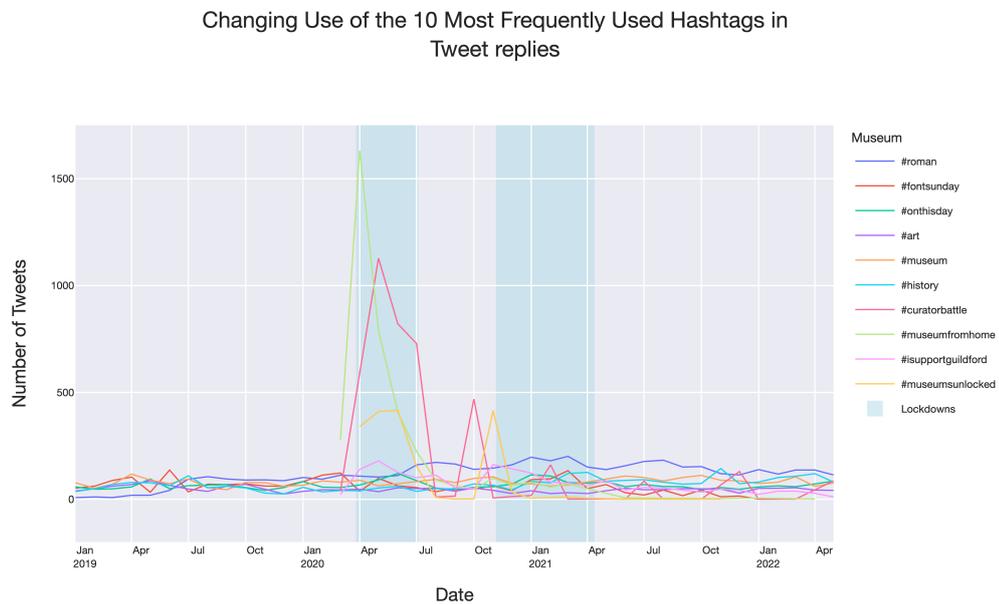


Figure C.3: Changing use of the 10 most popular hashtags in replies.

The most used hashtags in replies are significantly different (Figures C.3 and C.4), in addition to the April peak of #museumsfrom home, there is notable peaks in the use of #curatorbattle in May of 2020 and #museumsunlocked in the same

C. Topics Over Time

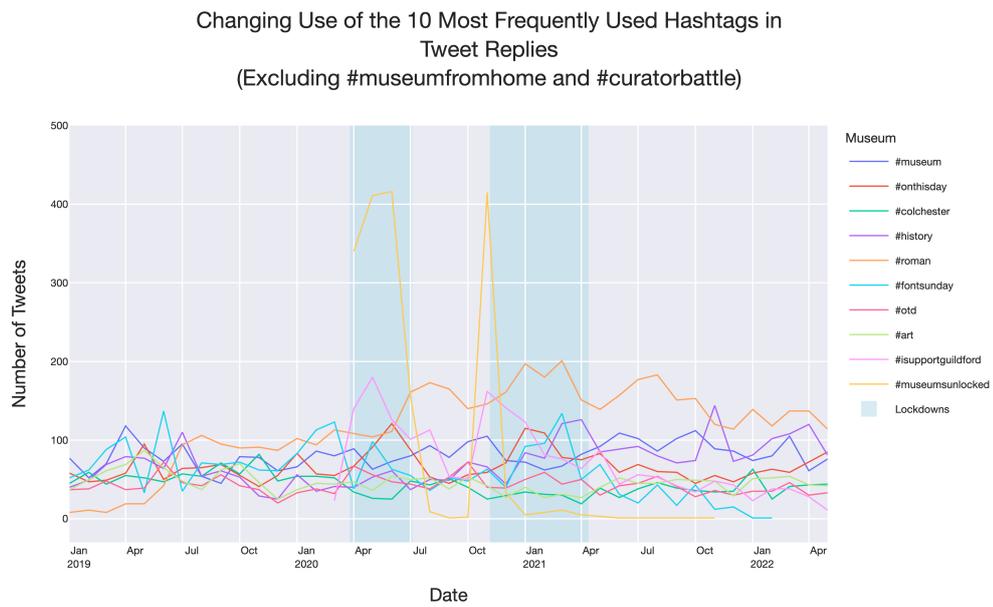


Figure C.4: Changing use of the 10 most popular hashtags in replies, excluding the hashtags #museumfromhome and #curatorbattle.

period. Notable these two hashtags see a second peak in October and November respectively, coinciding with the second set of lockdown restrictions.

Appendix D

Popular Topics

D. Popular Topics

Engagement Rank	Topic name	Theme	Representation	Median no. of interactions	No. of museums using the topic
1	The Beatles	Pop Culture	['beatles', 'onthisday', 'thebeatles', 'album', 'johnlennon', 'lennon', 'song']	104	427
2	Tanks	War	['tank', 'tanks', 'gun', 'tiger', 'godt', 'tankfest', 'armoured']	81	324
3	Vaginas	Health	['vagina', 'vulva', 'auction', 'vaginamuseum', 'openson', 'bid', 'slang']	44	259
4	English Civil War	War	['17thcentury', 'old', 'onthisday', 'englishcivilwar', 'cromwell', 'parliament', 'royalist']	37	338
5	Kent Railways	Transport	['dungeness', 'romney', 'hythe', 'kent', 'r17csawtbw', 'driver', 'newromney']	27	232
6	Trains	Transport	['steam', 'railway', 'train', 'trains', 'diesel', 'gala', 'class']	22	547
7	Northern Ireland	Location	['folks', 'stay', 'fermanaghcalmwater', 'embraceagiantspirit', 'safe', 'filyourheartwithireland', 'eme']	22	578
8	Code Breaking	War/ Technology	['bletchley', 'enigma', 'park', 'machines', 'intelligence', 'secret', 'turing']	20	325
9	Posters	Collection	['poster', 'de', 'cover', '1928', 'ie', '1925', 'magazine']	19	321
10	Tate	Museum	['tate', 'modern', 'britain', 'art', 'artist', 'ives', 'tatestives']	18	382
11	Typography	Collection	['fontuesday', 'examples', 'noon', 'send', 'fonts', 'design', 'favourites']	18	496
12	Titanic	Transport/ Tragedy	['titanic', 'titanicbelfast', 'belfast', 'ssnomadic', 'rms', 'hms', 'nomadic']	17	206
13	Army	War	['army', 'sandhurst', 'officer', 'training', 'cadets', 'britisharmy', 'leadership']	17	360
14	Canada	Location	['explorecanada', 'visitnovascotia', 'featured', 'nova', 'scotia', 'rediscovernovascotia', 'cape']	16	316
15	Jane Austen	Author/ Artist	['austen', 'jane', 'gaskell', 'elizabeth', 'janeausten', 'charlotte', 'her']	16	430
16	Charles Dickens	Author/ Artist	['dickens', 'charles', 'dickensmuseum', 'charlesdickens', 'his', 'twist', 'novel']	16	298
17	Shakespeare	Author/ Artist	['shakespeare', 'theatre', 'shakespeareunday', 'midsummer', 'macbeth', 'dream', 'globe']	15	509
18	Cold War	War/ Transport	['vulcan', 'twitterforce', 'xmf594', 'coldwarcallup20', 'avro', 'cold', 'shirt']	15	149
19	Paintings	Collection	['painting', 'portrait', 'oil', 'painted', 'artist', 'born', 'paintings']	14	660
20	Tropical Medicine	Health	['lism', 'seminar', 'research', 'professor', 'dr', 'global', 'malaria']	14	219

Table D.1: Top 20 topics that received highest median level of interactions on Twitter, shown alongside the number of museums who posted about that topic.

D. Popular Topics

Engagement Rank	Topic name	Theme	Representation	Median no. of interactions	No. of museums using the topic
1	Bournemouth	Location	['bournemouth', 'lovebournemouth', 'ig', 'dorset', 'pooie', 'respectprotectenjoy', 'planahead']	347	205
2	Tanks	War	['tank', 'tanks', 'tiger', 'tankmuseum', 'tankfest', 'tankmuseumshop', 'armoured']	339	237
3	Kent Railways	Transport	['rhd', 'romney', 'hythe', 'dungeness', 'steam', 'timetable', 'org']	135	241
4	Firearms	War	['gun', 'rifle', 'pisto', 'godt', 'firearms', 'caliber', 'revolver']	124	190
5	Trains	Transport	['railway', 'train', 'steam', 'trains', 'locomotive', 'class', 'diesel']	97	650
6	Army	War	['army', 'cadets', 'sandhurst', 'officer', 'training', 'engineers', 'corps']	95	263
7	Trams	Transport	['trams', 'tram', 'tramway', 'blackpool', 'car', 'crich', 'manx']	92	311
8	Photography	Collections	['gunby', 'photographer', 'dales', 'volunteer', 'gardens', '3hd5qoj', 'david']	77	377
9	Jersey	Location	['jersey', 'jerseyci', 'island', 'theislandbreak', 'tunnels', 'ow', 'http']	72	205
10	Buses	Transport	['bus', 'buses', 'transport', 'manchester', 'museum', 'vehicles', 'service']	60	419
11	Lighthouses	Location	['lighthouse', 'kinnaird', 'lighthouses', 'fraserburgh', 'head', 'arbroath']	60	248
12	The Duchess (Train)	Transport	['duchess', 'sutherland', '6233', 'rms', 'passing', 'dawlish', 'york', '46233', 'class', 'station']	58	325
13	France	Location	['de', 'la', 'et', 'le', 'vous', 'les', 'arras', 'du', 'pour', 'des']	56	188
14	Ancient Rome	Collections	['emperor', 'roman', 'rome', 'was', 'caesar', 'empire', 'ad', 'his', 'trionitum', 'he']	56	162
15	Stonehenge	Collections	['stonehenge', 'eht', 'stone', 'stones', 'salisbury', 'wiltshire', 'monument', 'social', 'neolithic', 'wessex']	54	326
16	Warhammer	War/Other	['warhammer', 'world', 'diorama', 'gaming', 'warhammerworld', 'hobby', 'bugman']	54	280
17	90_poster_78dengate_mackintosh_derngate	Other	['poster', '78dengate', 'mackintosh', 'dengate', '1920', '1928', '1930']	53	275
18	Tamworth Castle	Location	['castle', 'tamworth', 'grounds', 'tamworthcastle', 'the', 'you', 'visit']	52	463
19	Titanic	Transport/ Tragedy	['titanic', 'belfast', 'nomadic', 'ss', 'titanicbelfast', 'ship', 'rms']	50	181
20	Classic Cars	Transport	['bridgeclassiccarscompetitions', 'classic', 'bridgeclassiccars', 'product', 'car', 'cars']	48	222

Table D.2: Top 20 topics that received highest median level of interactions on Facebook, shown alongside the number of museums who posted about that topic.

Appendix E

Most Shared Facebook Posts

E. Most Shared Facebook Posts

Rank	Post text	Number of shares
1	<p>Step into the weekend with the hypnotic, technicolor floor installations by Scottish artist #JimLambie. Ongoing series collectively titled 'Zobop' - first #installation completed in 1999. #FridayFeeling</p> <p>War Horse, the National Theatre's stage adaptation of the novel by Michael Morpurgo, tells the story of the horses sold to the army for service during WW1.</p> <p>To adapt the story for a stage production, the life-sized puppet, 'Joey' was created by the Handspring Puppet Company, brought to life by three puppeteers and choreographed to create movement and emotion. Explore our collection: https://fal.cn/3f0Jn</p>	34886
2	<p>"When you go home, tell them of us and say, for their tomorrow we gave our today"</p> <p>Pictured is the beloved 1101 sculpture created by artist Ray Lonsdale. Known locally as 'Tommy', this WW1 soldier stands proudly on duty on Seaham sea front. At the going down of the sun and in the morning, we will remember them.</p>	32755
3	<p>Today marks the 17th anniversary of Concorde's last ever flight. As Concorde Alpha Foxtrot - now on display at Aerospace Bristol - landed at her Filton birthplace on 26th November 2003,</p> <p>an incredible era of supersonic passenger travel came to an end. To commemorate the occasion, we're pleased to share this glimpse inside the cockpit of Concorde Alpha Foxtrot.</p> <p>With many thanks to Vu360 Virtual Tours for kindly creating this wonderful image for us.</p> <p>And, in celebration of the anniversary of Concorde's final flight,</p> <p>we're now offering a range of ways that you can celebrate or remember the Concorde enthusiast in your life this Christmas, and support the museum through this difficult time. Donate today, or buy a pack of Concorde Christmas Cards, and you will be ensuring Concorde can be conserved for future generations.</p> <p>It's the gift that keeps on giving! https://aerospac Bristol.org/support-at-christmas</p>	24485
4	<p>Griffin the Tawny Owl is a bit of a water baby and can often be seen bathing like this on sunny days after flying in our 11.30am 'World of Owls' flying display. #muncaster</p>	21884
5	<p>It's been two years since we met spitting cobras at the Liverpool School of Tropical Medicine - and they've got no less wonderful - Discover why cobras spit, and explore their complex evolutionary history. Find out more: https://bit.ly/NHM-Cobras-May20</p>	21135
6	<p>** Update Monday 21st December, 5pm. Boo is still missing - please keep sharing and keeping an eye out. Boo was last seen near the sand dunes on Holkham beach on Saturday afternoon.</p> <p>Let's get Boo home to her family for Christmas**</p>	20825
7	<p>Boo was lost on Holkham Beach yesterday afternoon and is still missing today. If you're out and about in the area today, please keep an eye out. If found, she has a tag on her collar with phone numbers of owners in Burnham Thorpe. Alternatively, please contact Lisa Wheeler.</p> <p>Thank you. Please share</p> <p>Let's get Boo home to her family.</p>	20606
8	<p>Holocaust Memorial Day, 27th January 2019.</p>	19657
9	<p>It is with the deepest sadness we have to announce Lord Bath has died at the age of 87. Alexander Thynn, 7th Marquess of Bath, passed away on Saturday, 4th April.</p> <p>He was admitted to the Royal United Hospital in Bath on 28th March where it was confirmed he had the Coronavirus. The family would like to express their great appreciation for the dedicated team of nurses, doctors and other staff who cared so professionally and compassionately for Alexander in these extremely difficult times for everyone.</p> <p>They would politely request a period of privacy to deal with their loss.</p>	19496
10	<p>'Today means memory of many, many men who were with me' Yesterday, four D-Day veterans were awarded the Légion d'honneur, France's highest honour, during a ceremony on HMS Belfast. Hear from them about their memories of D-Day and what it means to receive the honour. #DDay75</p>	17286

Table E.1: Top 10 most shared Facebook posts.

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