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Online User Research Literature Review
UK Gallery, Library, Archive and Museum (GLAM) Digital Collections

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Executive Summary

This review of literature investigates existing user research relating to the UK's Gallery, Library, Archive and Museum (GLAM) digital collections. Over the last 30 years, the number of online collections, and the number of online visitors using those collections, has increased significantly. Although the use of collections has been on the rise, whether it is meaningful in terms of audience engagement, understanding and appreciation is still questionable, particularly in relation to accurate user behavioural data. A proper understanding of who and how visitors use digital collections is critical for the success of the UK's galleries, libraries, archives and museums in the information age. This review looks at available work from 2015 to 2021 to compare ways in which users have been categorised, their behaviours and identify areas where further discussion is required. Within the date range; 2015-2021, there is limited material on what characterise user categories leading Rees and Vitale (2020) to state: "Actual profiles of potential audiences are thin on the ground" (2020, p. 9). While a range of work on digital audiences exist, in-depth empirical research does appear to have slowed since 2015. There has been a focus within the GLAM sector on quantitative reporting which lacks detail and nuance in terms of audience behaviours. This leads to a lack of richer and deeper understanding of digital users.

Analysis of the collection of relevant research identified as having a UK digital collection focus resulted in a total of 87 separate user categories. Audience types were grouped together and described in various levels of detail. There are four key approaches to categorising users within the published and unpublished literature:

- groupings based on motivation or information seeking behaviour;
- level of expertise or role e.g. scholarly researcher, professional, engaged amateur and non-expert/general public;
- mode of interaction;
- web analytics.

A number of studies cited in this review have produced segmentation profiles based on cultural values, independent of specific cultural heritage organisations, collections, systems and situations, which goes some way to provide a shared approach to understanding audiences. These models are not dedicated to digital collections, instead looking at a broad spectrum of cultural heritage and arts activities. A process for applying standardised categories across organisations using motivation as a driver in combination with user dimensions; role, level of expertise, and mode of interaction could be used to create more standardised and consistent user categories across the sector.

User Behaviours

The available research suggests that that user behaviours are complex. The same individual user could visit a digital collection on multiple occasions but with different objectives and goals. The motivation and mode of interaction segmentation approaches highlight that users can play multiple roles in relation to a digital collection. Users can often switch modes between broad, topic-based searches to known item searches and back again, sometimes in the same session.

User motivations broadly range between:

- **casual use**, where a user is browsing for pleasure or inspiration rather than searching or researching for specific information. The research suggests that the casual user makes up a large proportion of digital collection users.
- **personal interest**, users search for specific information for personal interest. Personal Interest users tend to arrive on the digital collection through looking for terms on search engines;
- **scholarly and professional research**, users who are highly motivated and are looking for specific information for research purposes.

The research identifies a series of behaviours which can be broadly categorised:

- **Understand** – users want an overview of the collections or galleries;
- **Explore/Cruising/ Aesthetic** - users who are looking for inspiration;
- **Curiosity** – Enquiry-led users are likely to check a fact or look to answer a specific question.
- **Develop/Digging** - share the explorers desire for inspiration but have a stronger sense of focus as their needs are directed to specific topics;
- **Research/Intellectual** - users who are very focused and require detailed information on a specific topic or object;
- **Sharing/Social** - focussed on object sharing via social media.

Non-users

The literature suggests that it is difficult to identify categories of 'non-users' of digital collections due to non-users typically being underrepresented in audience research. It has also been suggested digital collection non-users appear to reproduce similar participation hierarchies and inequalities that already exist in physical cultural heritage settings.

COVID-19 audience segmentation

A series of audience segmentation approaches have also been devised in response to the impact of COVID-19 on the cultural heritage sector. This segmentation considers the shift in audience needs highlighting the emotional and social needs created by pandemic lock-downs. Leading researchers to suggest that audience behaviour will be different in after the pandemic', particularly in relation to greater digital engagement.

Moving towards Impact and Value

Wider literature on digital cultural heritage and audiences suggests a shift away from user behaviour towards impact and value of digital collections and projects. For example; Europeana's work on impact studies and the role digitised collections can play in providing benefit for social good and economic value. There has also been a growth in bespoke digital resources and projects as standalone endeavours. Crowdsourcing, in particular, has been increasingly explored. Although research suggests that only a small number of 'super users' (very engaged enthusiasts) make up the large percentage of users and contributors.

Section 1: Introduction

This review of literature investigates existing user research relating to the UK's Gallery, Library, Archive and Museum (GLAM) digital collections. The literature review is a component of a large-scale AHRC Towards a National Collection programme, which aims to have a transformative impact on digital search and cataloguing tools for collections enhancing research capability, public access and public engagement with heritage.

Continual digital innovation of information has enabled the exponential growth in the digitisation of GLAM collections. Standards of good practice and technical digitisation guidelines have been firmly established following extensive investment in the 1990s enabling the conversion of museum, library and archive collections (L. M. Hughes, 2004; Lee, 2002; MacDonald, 2006; Terras, 2008, 2011). This expansion of their digital offerings aimed to provide increasing engagement with and access to collections (Keene, 1998; Marty, 2008; Parry, 2010; Terras, 2011) in an effort to widen participation and to adhere to the idea of being visitor centered (Anderson, 2004). Indeed, one of the key benefits of digital technologies mentioned in the government report *Culture is Digital* (Department for Digital, Culture, Media and Sports (DCMS), 2018) is their capacity to reach larger and more diverse audiences, 'including those who may have been previously disengaged or uninterested' (p. 9). However, creating digital content and opening up collections may make GLAM content available, but not necessarily accessible (Trant, 2006) or usable.

Over the last 30 years, the number of online collections, and the number of online visitors using those collections, has increased significantly. Similarly, there has also been significant advancement in the development of appropriate, flexible and effective methodologies to assess the use, impact and value of digital and physical collections on visitor behaviour. But implementation varies across institutions. These changes have posed challenges for cultural heritage professionals, and academics alike, seeking to understand how digital collections feature in the behavioural practices of their online visitors. Although the use of collections and frequency of evaluation has been on the rise, whether it is meaningful in terms of audience engagement, understanding and appreciation is still questionable, particularly in relation to accurate user behavioural data. A proper understanding of who and how visitors use digital collections is critical for the success of the UK's galleries, libraries, archives and museums in the information age.

GLAM institutions are now expected to host a proportion of their content online, and multiple organisations have seen a major change in how collections and services are planned and managed with a shift to evidence based practice as a tool to support decision making. Over the years, a range of studies have explored the diversity of online users with various demographics, expertise, professions, roles, motivations and information seeking behaviours (Beagrie & Houghton, 2013; Case & Given, 2016; Dobreva et al., 2012; L. M. Hughes, 2012; Villaespesa, 2019). It is clear that understanding and categorising users of digital collections can help to develop, enhance and evaluate collections, however there is still a lack of agreement of appropriate definitions and categories of users of digital GLAM content (Booth, 1998; Dawson et al., 2004; Peacock & Brownbill, 2007; Sattar Chaudhry & Pei Jiun, 2005; Walsh et al., 2016b). A flurry of audience research activity occurred from the early 2000s to 2015; but academic discourse in the UK appears to have slowed since that date. Alongside this European cultural heritage institutions reported a third of their

collections have been digitized yet less than 10% are published online (Nauta et al., 2017). Research has also indicated that engagement with digitised collections has seen limited growth, and even decline over time (Mihelj et al., 2019). Leading authors Navarrete and Villaespesa to suggest that the relevance of cultural heritage digital collections 'looks grim' (Navarrete & Villaespesa, 2020, p. 224). Despite this pessimistic context, the COVID-19 pandemic has had a beneficial impact on audience engagement with, and openness to, cultural digital experiences.

Therefore, this literature review looks at available work from 2015 to 2021 to compare ways in which users have been categorised and provide points for open discussion. The research started with a mapping exercise of existing published material and unpublished internal reports, where available, to understand if and how Gallery, Library, Archive and Museum (GLAM) digital collections are used, by whom and to explore the factors influencing their use and impact. The review considered academic literature, reports, summary papers and other documents and presentations. Relevant material was searched online using combinations of keywords (Appendix C) and starting from bibliographic databases and journals in the areas of cultural heritage, museum, library, archive and visitor studies. Calls for unpublished materials of immediate relevance were also issued via Twitter, and two key JISC mailing lists (Museums Computer Group, and Visitor Studies Group). It is hoped that this review will provide a clear definition of key characteristics of user behaviours in and with GLAM digital collections. This research goes on to critically analyse the available data to identify user categories; including user expertise, motivations, roles and information seeking behaviour. Key current user types of UK digital collections are analysed and audience segments who are not currently using UK digital collections have been compiled. Any significant gaps in available data have been pinpointed in order to inform future research.

Structure of the report

The overall purpose of this literature review is to present evidence from the sector detailing the current availability of information on user research for Gallery, Library, Archive and Museums (GLAM). Following this Introduction, Section 2 discusses related work with respect to categorising users and audiences within cultural heritage; Section 3 describes the systematic approach to identifying relevant literature; Section 4 provides an analysis of the current literature and provides a summary of UK audience segments; Section 5 compares a selective set of international research; Section 6 compares user groups and provides areas of discussion; section 7 highlights audience segments who are not currently using UK digital collections; finally section 8 discusses the key findings and opportunities for future work in the area of online users and GLAM digital collections.

Section 2: Previous Work

The practice of user studies and audience segmentation—assessing and dividing audiences into homogeneous categories with similar characteristics, needs and behaviours (McDonald et al., 2003)—is well established in the GLAM sector and numerous research studies have explored the relationships between online collections and their visitors (see e.g., Cunliffe et al., 2001; Filippini Fantoni et al., 2012; Goldman & Schaller, 2004; Kravchyna, 2004; Siatri, 1999; Vilar & Šauperl, 2014; Villaespesa, 2019; Walsh et al., 2016). Originally focused on demographics, over the years several different methods of audience categorization have emerged, based on a range of measures varying from demographics, personality, interests, expertise, professions, motivation, task, modes of interaction and information-seeking behaviour (for more general Cultural Heritage audience segmentation see the Audience Agency's 'Audience Spectrum' and Morris Hargreaves McIntyre's Culture Segments[1]). As early as the 1980s, research highlighted the importance of understanding and categorising users to help to develop, enhance and evaluate digital collection systems (Taylor, 1982; Vollaro & Hawkins, 1986), with Skov and Ingwersen going on to state "Understanding online museum visitor behaviour is critical to the development of relevant and useful museum websites" (2014, p. 92). Yet, despite the wealth of studies carried out to identify and characterise users of GLAM digital collections, it can be hard to define useful and consistent categories; particularly across the sector, with libraries, archives, museums and galleries all having different categorisation approaches (Walsh et al., 2016b). Dobreva et al., (2011) even suggest that despite the increasing volume of digitized GLAM collections, user studies have been limited in scope and lacking in depth. They go on to identify a paradox in the work of GLAM digital collection user studies:

> "major institutions from the cultural heritage sector clearly emphasize the place of user evaluation and feedback in digitization-related polces. But in reality, decisions about aspects of digitization that impact [on] user are frequently taken without direct user involvement." (Dobreva et al., 2011, p. 73)

Despite this paradox there have been a range of studies with a focus on categorising users of cultural heritage resources (see, e.g. Walsh et al., 2016) with user groupings described in varying levels of detail. Several studies are based on one factor, such as motivation, task, role, technical knowledge, cultural heritage knowledge, domain knowledge or demographics, often resulting in short descriptions for sometimes abstract and generic identified user groups (ibid, p.1).

User Categories based on level of Expertise

Level of expertise is one of the most common factors for categorising different types of user. Johnson (2008, 2013) identifies a simple distinction between generic user groups; *novice* and *expert*. Much of the literature considers cultural heritage employees (e.g., librarians, archivists) or academic researchers (e.g., historians, scholars) (Duff & Johnson, 2002; Ross & Terras, 2011) as expert or professional users who have higher levels of subject and domain knowledge and are more confident

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[1] http://www.theaudienceagency.org/audience-spectrum and https://mhminsight.com/culture-segments

in search practices. Amin et al., (2008) uses the term 'Cultural Heritage Expert' with Europeana using the category 'Culture Vultures' that includes cultural heritage professionals, involved in learning, researching or the teaching of arts and humanities, 'expert amateurs' in some subject of cultural heritage, or people who are interested in culture and cultural heritage more than most (Haskiya et al., 2014). Beagrie and Houghton (2013) in their analysis of the users of the Archaeological Data Service identify 23 distinct roles all with varying levels of expertise. Marty (2006) uses the notion of Museum Information Professional (MIP), and related sub-categories of MIP, as someone specifically trained to deal with museum informatics issues who are concerned with meeting user needs. At the other end of the spectrum the non-expert (alternative terms include novice and lay user; Warwick (2010) going as far as to describe non-expert users as Luddites), are typified as having no formal or only limited cultural heritage training (Goodale, 2016; Vilar & Šauperl, 2014) or being entirely new to the digital environment (Pantano, 2011). Vilar and Šauperl (2014) go further to divide the non-expert user into two sub categories: The experienced lay user, identified as having some previous experience with the system/task, but in comparison to the professional user their knowledge of the task and system experience is limited. Whereas, the novice lay user is someone new to the entire environment and usually unable to perform the task requirements successfully. Sweetnam et al., (2013) work on the CULTURA project developed a user taxonomy: professional researchers, apprentice investigators, informed users and the general public. This latter diverse group is interesting as Hertzum's (1999) work suggests the 'general public' was a primary audience of the majority of museums studied but it is " a grouping so heterogeneous that it provides little guidance regarding the design of the site"(1999, p. 131). Skov (2013) identifies that further detailed research on the novice user group and the 'general public' category would be beneficial to the understanding of this user group.

User Groups based on Information Seeking Behaviour and Information Need

Previous research on specific user groups' information-seeking behaviour has contributed to the development of numerous digital library, archival and museum collections (Buchanan et al., 2005; Makri et al., 2006; Ross & Terras, 2011; Warwick et al., 2007). Information seeking behaviour can be defined as a conscious effort to acquire information in response to a need or gap in a user's knowledge (Case & Given, 2016). Booth's (1998) analysis of the virtual and physical visitors to the Science Museum in London identified three user categories based on information need: *general visitors* who require general information, such as opening hours, what's on or ticketing information; *educational visitors* who require additional, detailed information to plan their visit; and *specialist visitors* who require more detailed collections information and access to expertise (1998, p. 150). Marchionini et al. (2003) in their research on the Library of Congress National Digital Library users combine motivational characteristics with domain knowledge, system knowledge, level of focus and time allocation to produce nine different user groups: staff, hobbyists, scholars, professional researchers, rummagers (browsers), object seekers, surfers, Teachers K-16, Students K-16 (2003, p. 153). Skov and Ingwersen (2008) identified four characteristics of information seeking behaviour of digital museum visitors; meaning making, known item/element searching, exploratory behaviour and highly visual experience. These characteristics suggest differences between professional/academic and non-professional behaviour. Wendy Duff (2012) agrees stating that archive users information seeking behaviour are different if the user is a novice or an expert. Other user studies have identified that GLAM online collections also attract casual users or 'cultural

snackers' (Haskiya et al., 2014); people that consume cultural heritage collections in the context of leisure or hedonistic activities, without a specific information seeking need. This aligns the grouping of casual-leisure users who perform short-term activities, requiring little or no training, but which are often intrinsically rewarding (Elsweiler et al., 2011).

User Groups based on Motivation

Previous studies of digital cultural heritage audiences have also considered user's motivations as an approach to categorise users. Falk's (2009) Visitor Experience Model, originally devised for physical spaces, has been well used within GLAM online collections, describing five visitor identities, each representing a different motivation: explorer, facilitator, experience-seeker, professional hobbyist, and recharger. For example Filippini Fantoni et al. (2012) transferred Falk's model online using the Indianapolis Art Museum website as a case study. They identified five main motivations for visiting: to plan a visit, find information for professional reasons, find information for personal reasons, browse, or make a transaction. They conducted a one-question survey encompassing these five motivations, using Google Analytics to better understand these five groups. Twenty-one cultural institutions in the United Kingdom conducted a similar study as part of Culture 24's 'Let's Get Real' action research project (Malde et al., 2013) highlighting that by utilising motivation categories data analytics can be better interpreted enabling a fuller picture of audience engagement with online collections. All of this work, however, has a focus more generally on cultural heritage websites, rather than a dedicated focus on online collections.

This research considers how user categories are currently defined across studies which relate to UK GLAM digital collections. A review of relevant literature has been undertaken to identify the ways in which the users of UK digital cultural heritage collections have been categorised between 2015 and 2021. This has been compared to a selective set of international research to position the UK work in a wider global context. User categories are considered based on generic dimensions, such as level of domain knowledge and perceived motivation. This review provides useful insights into audience segments who are and who are not currently using GLAM digital collections

Section 3: Methodology

This desk-based literature review began with retrieving and collecting related publications. The systematic search of the extant literature focused on evidence of online users, access, use, and behaviours with GLAM digital collections. A keyword search strategy (Appendix C) was developed and refined, then used systematically across six electronic bibliographic databases (namely: JSTOR; Ingenta; Scopus; Taylor and Francis; Proquest and Wiley). In addition, Google Scholar, Mendeley, specialist journals (namely Archival Science; Curator; International Journal on Digital Libraries; International Journal of Heritage Studies; Journal of Documentation; Museum Management and Curatorship and Visitor Studies) and relevant websites (such as Museums and the Web conference website, Nesta, Collections Trust; ICOM; and Department for Digital, Culture, Media and Sport) were also searched. A series of keywords were identified; online users, digital collections, museum, library, archive, gallery, cultural heritage, visitors, audience and segmentation. The retrieval returned 206 documents. The publications were then exported to Zotero referencing software to remove duplicate records. A set of inclusion criteria based on date was drawn up to help eliminate the low-relevance publications. This limited the results to material published between 2015 and 2021, this step resulted in 162 publications for review. A screening review removed further low-relevance publications, where work was included if a user category, segment, role or group was identified. This was then further refined into type of GLAM organisation (museum, library, archive, gallery, heritage, general) and if the digital collection was in the UK or International. In total, 136 publications were reviewed. In conjunction with a review of published material, calls for unpublished materials of immediate relevance were also issued via Twitter, and two key JISC mailing lists (Museums Computer Group and Visitor Studies Group).

Section 4: Analysis of Current Literature

Within the date range; 2015-2021, there is limited material on what characterise user categories leading Rees and Vitale (2020) to state: "Actual profiles of potential audiences are thin on the ground" (2020, p. 9). Nevertheless, the collection of relevant research identified as having a UK digital collection focus were analysed, in order to discover the different categories used by studies to understand and interpret distinct audience types. This resulted in a total of 87 separate user categories. There are similarities in the terminology of the categories used, but a lack of consistency in naming categories across the sector. Audience types were grouped together and described in various levels of detail. This variation in detailed descriptions of user categories was also noted by Walsh et al., (2016b). Some studies focus on one or two specific user categories and others include up to twelve distinct audience types. There are two clear distinctions that emerge repeatedly when categorising users; groupings based on motivation or information seeking behaviour and that of the broad classes of level of expertise or role as a segmentation device e.g. scholarly researcher, professional, engaged amateur and non-expert/general public. A more recent type of user categorisation is emerging - that of mode of interaction. These studies are supported (or not) by quantitative data from web analytics.

User Expertise & Role

In comparison to previous research on user categories there is less of a focus on level of expertise and more on professional roles as a common factor for categorising different types of user. The focus on professional roles still supports a form of domain expertise (Johnson, 2013), where knowledge of the content and infrastructure of a digital collection enables 'experts' to successfully navigate and use a resource. Whereas a more 'general visitor' or 'novice' (Johnson, 2013) struggle to retrieve meaningful results particularly from digital collections using search-based interfaces (Windhager et al., 2019).

Many of the user categories within the literature base labels on specific professional roles, particularly those with an already established interest with the cultural heritage sector; for example historians (Dunley & Pugh, 2021), archaeologists (Guntram & Wright, 2019; Power et al., 2017) archivists (Richmond, 2021) and librarians (Phillips-Bacher, 2021). Academic and professional researchers also feature highly in numerous studies (Art UK, 2018; Fildes, 2020b; Pelan, 2018; Walsh et al., 2020, 2021, 2017). Wusteman (2017) identify two separate academic user categories: digital humanist, described as 'a trained academic researcher with strong technical skills and experience using digital editions and the various tools these editions provide' (McGarry, 2015 quoted in Wusteman 2017) and traditional academic who 'tends to be less technically oriented and is unfamiliar with the traditional tropes of digital scholarly editions' (McGarry, 2015 quoted in Wusteman 2017). Recent work by Research Bods et al., (2021) from a survey of 992 respondents combine level of expertise with technology ('tech-savviness') alongside levels of interest in history/heritage. Producing five audience groupings ranging from high engagement with both history and tech through to low engagement with both. Interestingly the grouping with low interest in history and low technology competence represent the largest proportion of respondents (30%) from their survey (Research Bods et al., 2021).

The use of expertise descriptions support the previous work on levels of expertise, experience or

domain knowledge as a driver for user categorisation (Walsh et al., 2016b). However, work by Walsh et al., (2017) at the National Museums of Liverpool report the users with high levels of expertise only form a small fraction of the total number of online users.

Students and Teachers

Several studies identify students and teachers as distinct user categories (Art UK, 2018; Fildes, 2018, 2020a; Pelan, 2018; Siefring, 2019; Stack & Villaespesa, 2015; Walsh et al., 2020, 2017). Art UK (2018) has the most delineated user groups starting with 'Teacher/Tutor: Primary' and going on to 'Teacher/Tutor: Higher Education (18+)' out of the 1,872 participants in the Art UK user survey 3.2% self-identified as Teachers, with most representation from Higher Education (1.76%). Fildes (2018), in comparison, Teaching category is 11% of 521 respondents .

Despite being outside of the timeframe allocated for this literature review Sweetnam et al., (2012) work from the CULTURA project provide a useful description of a student user group. Sweetnam et al., (2012, p. 69) characterise student users as apprentice investigators who are beginning to acquire familiarity both with the research process and with the content of the heritage collections. The ability to visualise collections was identified as an especially useful way for students to gain an overall understanding of the structure of collections, with map-based visualisation singled out as especially useful (Sweetnam et al., 2012). This supports Rees and Vitale (2020) strategic interview work from Locating a National Collection identifying using a map as a clear feature for digital collection interfaces. Typically it is thought that the student user group is largely made up of students in Higher Education, however Art UK 8.8% identified as Students, with the majority from Further Education (2.03%) and Fildes (2018) highlight 25% of respondents were studying in school, compared to 15% at a university level. The Bodleian Libraries unsurprisingly identify students as a core user group (Siefring, 2019). It is worth noting that the proportion of the classification of student and teacher user groupings will vary throughout the academic year, therefore the timing of any quantitative or qualitative user studies will have a bearing on the measurement of these user groups (Villaespesa, 2019). It is proposed that educational user groups are a growth area for digital cultural heritage collections, and a series of detailed user studies to investigate how educational audiences use digital collections would be beneficial.

General Public

The general public is still a popular user category within the 2015-2021 literature, but as Walsh et al (2016b) question; "exactly who are the "general public"?" (2016b, p. 1). There is a clear need to gain a more nuanced understanding of this amorphous user group. Hauswedell et al., (2020) undertook a large review of digital newspaper archives across Australia, the Netherlands, UK and USA, including the British Library and the National Library of Scotland. They identify a general consensus from a series of semi-structured interviews with public and private providers of major newspaper digitisation programmes that the primary audience for digital newspaper archives is the 'general public' (Hauswedell et al., 2020) but include no explicit detail of what characterises this user group. Wusteman (2017) identified the general public as having a general interest. Walsh et al., go on to explore general public and non-professional groups characteristics in more detail (2017, 2020). With their 2020 study identifying that the "general public" and "non-professional" user groups make up approximately 77% of all visitors to the National Museums of Liverpool website. Their ongoing work

identified that these two user groups have significantly lower experience with digital cultural heritage collections, and that they are less likely to be repeat visitors and less likely to have high engagement if they do not find what they are looking for (Walsh et al., 2017). Suggesting that a significant number of users from these two categories will not remain on digital collection sites for long. A better understanding of who constitutes this 'general' user category would undoubtedly enable cultural heritage organisations to provide improved digital collections.

Walsh et al., (2020) argue that the general public category has often been characterised solely through the label, and that there is a clear need to further define the "general public" and how they differ from the more frequently studied expert users. Perhaps a more appropriate term is that of a 'casual user' - users in everyday, non-work contexts (Mayr et al., 2016) or as Walsh and Hall (2015) describe; someone who "has just stumbled across their collection in the same way that they would wander into the CH [Cultural Heritage] institution's physical space."(2015, p. 1). Suggesting that a casual user is browsing rather than searching or researching for specific information. Even with a change in terminology the 'casual user' is still a large and diverse group, and users will bring a very wide range of expertise, interests, technical abilities, and contextual awareness to digital collections. Therefore, characterising this category presents a challenge for the GLAM sector. This lack of definition is one of the potential reasons for a shift away from user expertise and role and profession as categorisation tools and a move towards motivation as a segmentation approach.

Motivation

Motivational segmentation has been used by a range of digital cultural heritage including Tate (Stack & Villaespesa, 2015), the Science Museum (Fildes, 2020b) and Frankly Green + Webb Insight for Change (2020) work with eight UK cultural heritage organisations. (See Table 1).

Author(s)	User Motivations
Stack & Villaespesa, 2015	Personal interest research
	Student research
	Professional research
	Inspiration
	Enjoyment
	Art News
	Repeat visit planning
	First time visit planning
	Organisational information
Frankly Green + Webb, 2020	Understanding the Experience
	Research
	Curiosity
	Practical Planning
	Education
	Commercial
	Development
	Support
	Other

Fildes, 2020	Studying school
	Studying University
	Teaching
	Personal interest
	Professional interest

Table 1: Motivational User Categories

There are similarities in the motivations identified in these research projects. With each identifying motivations around research (in formal and informal contexts), searching for personal interest, and planning the visit. Curiosity and Inspiration are particularly interesting motivational categories. Stack and Villaespeasa (2015) highlight from their 2014 survey resulting in 1,992 responses that 8% of users who are visiting for a visceral and largely aesthetic experience. They require detail, quality and want high-resolution images. Stack and Villaespeasa conclude that their agenda is therefore open and pleasure driven. The Curiosity user group, as identified by Frankly Green + Webb (2020), are likely to check a fact or look to answer a specific question. They highlight that curiosity as a motivation for digital engagement does not necessarily mean they are seeking a specific GLAM online collection out, but that a specific topic or question is the driver. Indicating that serendipity could have a role to play in users arriving at GLAM online collections. Serendipity's association with unexpected, positive user experiences and outcomes could help to understand how digital collections are used. Work by (Makri et al., 2016; McCay-Peet et al., 2017) understanding both how current digital information environments support serendipity and how novel approaches may be developed to facilitate it. Closely related to the curiosity motivation, as well as that of research motivations is that of information seeking behaviour, the "purposive seeking for information as a consequence of a need to satisfy some goal." (Wilson, 2000, p. 49). Gooding's (2016) research exploring users of a digital collection of Welsh newspapers avoids developing user motivations categories, but instead interprets digital user behaviour in comparison to user information seeking behaviour with physical collections. Findings indicate digital user behaviour is distinct from deep engagement with the printed text: users rarely browse through specific newspapers in the Welsh Newspapers Online collection, instead searching and browsing through the digital interface to discover material, and are therefore engaged in iterative information seeking (Gooding, 2016, p. 241).

Stack and Villaespeasa (2015) focus on the main Tate website, whereas earlier work from Villaespeasa (2014) looks specifically at the Arts and Artists online collection. The Arts and Artist online collection research was conducted prior to the whole website research in order to define some of the questions regarding motivation and usage behaviours. The responses were coded in different motivational categories to the 2015 work, identifying four motivational types of visit to the Arts and Artists online collection:

- **Intellectual:** the user has a clear research objective and is interested in learning and finding specific detail about a topic - for example for school/university work or professional work related to art.

- **Aesthetic/emotional:** users are searching for inspiration, with a clear focus on visual content. Villaespeasa identified that users come to the site to view specific artwork images

for pleasure, saw them in a recent visit or occasionally because they cannot see them in person.

- **Planning**: the user is searching for artworks on display that they can see in their physical gallery visit.

- **Social:** the user is looking for artworks to share on social media or use on their own blogs/websites. (Villaespesa, 2014)

The Audience Agency Digital Audience Survey (2020) looked more generally at how audiences have responded to cultural heritage organisations and the wider cultural sector moving much of their offering online during the COVID-19 lock-down period. This work focuses on audience motivations for engagement digitally, online habits and any change through the Covid-19 pandemic. The Audience Agency identified that visitors are motivated intellectually with 56% of 4,419 respondents in November 2020 citing To Learn Something as their main motivator, this was closely followed by To Be Intellectually Stimulated (48%) and To Be Inspired (45%). For Academic reasons, in comparison, is much lower at only 18%. Interestingly the digital audience survey also asked questions about emotions; with 58% stating they were engaging digitally with cultural organisations to boost their mood, and 37% were engaging to reduce stress and anxiety. This suggests that Digital Collections could have a positive role to play in supporting audience's health and wellbeing. There has been a range of work focusing on the health benefits provided by GLAM physical spaces and collections (Chatterjee & Noble, 2016; Fujiwara et al., 2015), but very little research on the health and wellbeing benefits of digital GLAM collections.

Samaroudi et al., (2020) from a survey of 83 cultural heritage institutions in the UK and the USA deployed a segmentation approach that was specifically devised for COVID-19 audiences. Three categories were identified: Audiences seeking learning support, Audiences seeking emotional support and entertainment, and Stakeholders who wish to keep involved. This is an adaptation of Jones's classification (2020). Samaroudi et al., (2020) demonstrate that most efforts from GLAM organisations were placed on providing a variety of offerings for audiences who already have an interest on the institutions' collection and related activities.

Motivational user categories are a potential approach to refine how audiences are conceptualised, moving away from demographic data, level of expertise and professional role to take account of users cultural values (The Audience Agency, n.d.), and their deep-seated values and beliefs (Morris Hargreaves McIntyre, n.d.).

Mode of Interaction

User research from the V&A in 2019 focused on three digital collection sites (From the Collections, Search the Collections and Search the Archives) identifying personal interest as the main user motivation for visiting the site, with 40% of 7,700 survey respondents. This was followed by academic use (25%), professional use (14%), visit planning (10%) and 'just browsing' (4%) (Craig, 2019). Suggesting users are visiting with intent rather than simply exploring with no real fixed goal. Craig (2019) highlights that these user motivations are fairly consistent across all sites, apart from Search the Archives, which has a larger focus on academic use (49%). Following an online survey, in-depth interviews and user observation sessions were undertaken, findings from this qualitative work produced four different modes of interaction, each with differing needs and motivations:

understand, explore, develop and research (Craig, 2019). Users within the understand mode of interaction want an overview of the collections or galleries; the explore mode of interaction contains users who are looking for inspiration; the develop interaction user category share the explorers desire for inspiration but have a stronger sense of focus as their needs are directed to specific topics. Whereas research interaction mode contains users who are very focused and require detailed information on a specific topic or object. Coburn (2016) identifies three user modes of interaction from user research on the experimental Tyne & Wear Archives & Museums (TWAM) Collections Dive generous interface: Cruising, digging and sharing. Cruising the collections involved users scrolling through collections but not engaging with any of the special interface features. The digging user category involved scrolling and a form of deeper engagement (selecting an item, zooming in on one or more objects, or accessing textual information) with objects in the collection (Coburn, 2016). The sharing user interaction mode focussed on object sharing via social media, similar to Villaespesa (2014) social user category where the user is looking for artworks to share on social media.

One of the most interesting findings from Coburn's work emerges when a significantly higher percentage of users visiting the TWAM collections search pages identified themselves as audiences who 'don't know what they are looking for' suggesting that a non-specialist or non-research focused audience has an interest in browsing a GLAM digital collection without a specific information seeking need (Coburn, 2016). With Coburn concluding that digital collections should encourage casual, curious audiences into and through the collection.

Studies have shown that user motivations, interactions and behaviours are complex. Using motivation and mode of interaction as segmentation tools enables users to move into different user categories and have multiple roles in relation to a single digital collection (Stack & Villaespesa, 2015; Walsh et al., 2016b). The same individual user could visit a digital collection on multiple occasions but with different objectives and goals. This change in needs and motivation can be affected by personal and external forces (Phillips-Bacher, 2021) including if a user's interest or level of expertise has increased.

Analytics and Log Data

Web analytics techniques —defined as the measurement, acquisition, analysis, and reporting of online data for the purposes of understanding and optimizing web usage and experience (Burby et al., 2007) are widely used across the GLAM sector to capture data on users' behaviours (Bogaard et al., 2019; Finnis et al., 2011; Gooding, 2016; Moffat, 2017; Voorbij, 2010). The advent of Google Analytics (GA) in 2005 provided an accessible and inexpensive tool for gathering vast amounts of quantitative data on visitor usage and engagement for any website and GA has become commonplace in GLAM studies which evaluate the impact of websites and digital resources.[2] However, studies which only utilise GA are often narrowly conceptualised without consideration of other contributors to user behaviour (Gooding, 2016) and it has been highlighted that GA data generally require contextual and attitudinal data to fully understand the user experience (Villaespesa, 2019). A known limitation of web analytics techniques is that it can only reveal how a

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[2] For examples of a range of studies which have used Google Analytics as a data source see Turner (2010), Way (2010) Villaespesa and Tasich (2012), Barba et al., (2013) and Gooding (2016).

website is used, and not why (Nicholas et al., 2004; Peacock & Brownbill, 2007; Zuccala & Thelwall, 2006) and without adequate training to unearth useful and meaningful analytics, GA in particular can lead to a superficial, metric-driven understanding of online user behaviour (Gooding, 2016; Moffat, 2017) or even ethically questionable user tracking that can be derived from aggregation of numerous data analytics sets (Hauswedell et al., 2020; O'Neil, 2016). This is why it is a shame that the Department for Culture Media and Sport (DCMS) does not require more nuanced data across UK national museums and galleries who report on a number of quantitative performance indicators to facilitate consistent reporting across the sector. Analysing annual reports can provide insight in the actual use of and importance attached to GLAM web statistics. For example, Table 2 adapted from the DCMS sponsored museums and galleries performance indicators published in January 2021 state the number of unique website visitors, but DCMS include the caveat that due to changes in the software used to measure website visits by many of the museums at several points over time, these figures are not directly comparable between years (DCMS, 2021). It is important to note that the use of web analytics within Annual Reports tend to focus on visitation to the whole website(s) rather than visitors who come to an online collection. In practice, web statistics are often used for internal rather than external comparison. Most Annual Reports do not explain the data and do not provide background information, which makes it difficult to interpret them. For example, it is unknown how a visit is defined, and which analytics tool has been used.

Museum/Gallery	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020
British Museum	32,501,070	34,700,000	37,529,494	33,599,878	33,914,521
Museum of the Home	323,763	313,938	284,654	195,309	161,345
Horniman Museum	648,215	558,000	733,000	706,000	708,000
Imperial War Museums	5,290,351	6,186,000	6,646,000	11,393,000	12,265,000
National Gallery	4,740,681	4,800,000	3,817,966	4,354,755	4,800,000
National Museums Liverpool	2,166,140	2,129,132	3,132,822	2,318,177	2,372,222
National Portrait Gallery	4,997,039	4,746,000	3,846,000	5,131,000	5,545,000
Natural History Museum	10,489,392	9,195,229	9,890,000	12,800,000	13,723,000
Royal Armouries	469,572	441,539	506,992	907,219	369,999
Royal Museums Greenwich	4,361,634	4,302,629	4,442,213	5,688,978	7,081,976
Science Museum Group (Does not include website visits for the National Coal Mining Museum)	12,119,000	11,656,000	11,585,000	10,398,000	10,963,000
Sir John Soane's Museum	427,972	411,809	541,502	456,590	535,544
Tate Gallery Group	12,791,976	15,029,798	17,169,000	18,901,000	20,059,000
Tyne and Wear Museums	N/A	N/A	N/A	N/A	N/A
Victoria and Albert Museum	11,718,200	12,588,000	13,344,539	15,684,609	15,162,589
Wallace Collection	611,587	610,053	632,656	681,680	734,000
Total*	**103,657,000**	**107,668,000**	**114,102,000**	**123,216,000**	**127,661,000**

Table 2: Number of unique website visitors, split by organisation 2015.16-2019/20 – adapted from DCMS 2021.
* (The totals have been rounded because some of the constituent numbers provided by museums are rounded)

Annual reports can, however, highlight a potential change in visitor behaviour in response to the COVID-19 pandemic in 2020-2021. For example; the British Museum reports that In 2020/21, 3.75m users looked at the online collection, an increase of 60% over 2019/20 (British Museum, 2021). The Natural History Museum's unique website visits increased by 1 million to 15.3m (Natural History Museum, 2021). The National Museums Scotland 2020 review indicate a 49% rise is traffic to the Search our Collections page (National Museums Scotland, 2020) but does not provide any further insight into actual figures or dates. The British Library Annual Report focused on the opening up of collections to an international audience, citing examples such as The Endangered Archives Programme (EAP) website, witnessing 230% increase in visitors from Peru after a Peruvian newspaper project went online (British Library, 2021). This upsurge in online visitors is interesting and supports work by the Audience Agency as part of the Cultural Participant Monitor, to identify cultural attendance, participation and online consumption before, during and beyond COVID-19 using representative samples of the UK population that audience engagement with, and openness to, cultural digital experiences have changed and will continue to change following the pandemic (The Audience Agency, 2021b).

Deeper insight into user behaviour using quantitative measures is often done through web log

analysis. All digital platforms have a facility by which logs are generated providing an automatic, real-time record of use. Web logs represent the digital footprints of users which can help to provide insights into users' search and navigation behaviours, such as the pages accessed, time spent on pages, and patterns of use. Gooding's (2016) work on web logs from Welsh Newspapers Online[3] demonstrates that log analysis can enrich our understanding of users of digital newspaper collections, but can not interpret the reasons for user behaviour. Whereas Walsh et al., (2019) do extend their analysis of web logs from National Museums Liverpool to identify a series of potential user groups. In total seven user groups were identified based on their activity characteristics:

- Single page viewers
- High all-round searchers
- Even visitors
- Single query general page visitors
- Deep level browsers
- General museum visitors
- Known item searchers

Future work as part of the Digital footprints and search pathways led by Gobinda Chowdhury with two national collections – National Museums Scotland and National Galleries of Scotland could further develop insights into user behaviour and categories through quantitative metrics.

Research using web analytics techniques have highlighted limitations including difficulties due to robot traffic and unreliable user identification as IP numbers can only be traced to a specific machine, not a specific individual (Gooding, 2016). These limitations support Peacock and Brownbill (2007) proposition that cultural heritage organisations avoid web analytics as a default tool and place web analytics data in a qualitative context by utilising surveys, observation, usability testing, and interviews with users.[4]

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[3] https://newspapers.library.wales/
[4] See Kabassi (2017) who provides a comprehensive review of museum website users using empirical and inspection methods.

Section 5: Selective Sample of International Literature

In order to put online user behaviours with UK GLAM digital collections into context a selective set of comparative international research has also been explored. This comparative sample is limited, particularly as only publications written in English have been considered.

Motivation at the Met, USA

Villaespesa's work for the Metropolitan Museum of Art (2019) extends the work on motivational audience segmentation. While previous study surveys asked users about the museum website as a whole, this study focused exclusively on the online collection. Six user categories were defined; professional researcher, personal interest information-seeker, student researcher, inspiration-seeker, casual browser, and visit planner. There are similarities in the segments identified in previous user studies looking at motivation (Romeo, 2016; Stack & Villaespesa, 2015), which as Villaespesa highlights, regardless of the percentage of visitors to each museum, the user segments can be grouped into three major motivations: research in the broadest sense of the term (personal and professional), browsing for inspiration, and visit planning (2019, p. 244). Similar to previous research from the National Museum of Liverpool (Walsh et al., 2020), the majority of users that come to The Met's online collection are not experts in the subject matter; they tend instead to have generalist interest and knowledge.

Europeana

Numerous studies have been undertaken to understand users of Europe's largest aggregated collection of digital cultural heritage: Europeana (Clough et al., 2017; Dani et al., 2015; Europeana, 2014; Haskiya et al., 2015). Despite being outside of the 2015-2021 date range the Europeana 2014 user survey (Europeana, 2014) yields some interesting results. The survey was issued in six languages resulting in 2,396 responses. With an initial focus on demographics the survey highlighted that generally more male users that female users access and use Europeana (it appears that the survey only catered for male/female categories, data collection language is continually shifting and previously used terms may no longer be appropriate, there is now a move towards recognising a gender spectrum by offering at least three options of 'male', 'female' or 'other' when asking questions on sex and gender identity). In the English version of the survey a 60:40 male: female split (908 of 1,497 respondents) was reported (Europeana, 2014). There was some variation in the non-English surveys:

- Highest: 74.6% male in the German user survey
- Lowest: 41.0% male in the Polish user survey – however the number of respondents is very low compared to the English Survey (56 responses vs 1,652 English survey responses).

Over 60% of respondents were in the 25-54 age range across all language surveys. There is also a highly educated user base with 64% of the respondents from the English survey self-reporting to holding an undergraduate degree or higher, this finding is broadly consistent across all language survey responses.

The Europeana user survey used motivational drivers to identify the purpose of user visits. Across all language surveys the most common reason for visiting was exploration within a topic (32%) with finding out more about Europeana a very close second (30%). Finding a specific item (17%) was a significantly lower priority. Suggesting that users are motivated by a topic rather than a specific need, and user progression through Europeana is from generic to the specific. This supports Coburn's (2016) assertion that users of an aggregated digital collection have a preference for browsing rather than searching.

Clough et al., (2017) Europeana user survey identify (n=240 participants) that the majority of respondents (30.4%) described themselves as academic. Followed by cultural heritage enthusiasts (24.6%); cultural heritage professionals (18.3%); students (13.3%); school teachers (4.6%); and others (8.8%). This research goes on to categorise users search tasks, focusing on user need, identifying six categories:

- Specific-item search: Search for specific item (i.e. known-item) typically expressed precisely (e.g. using title of book) 11.3%
- By named author: Search for information by a specific named author (or provider), e.g., "to look at paintings by Henriette Ronner", "I am searching for images of artifacts from the Regional Archaeological Museum Plovdiv." 7.1%
- Specific-subject search: Find information for specified (or named) subject (i.e., person, place, location, etc.) forming the main subject of the request, e.g., "I am looking for pictures of Stuttgart", "I'm looking for plans and images of Clermont-Ferrand." 24.6%
- General topical search: Find information for general subject, e.g. "Italian medieval illuminations", "Looking at examples of art made by women." 47.1%
- Browsing/Exploring: Used to identify searches where the user has no specific goal, e.g. "I am trying to explore the world through what is available in Europeana", "I'm just browsing your collections." 7.1%
- Ambiguous or unclear: Examples where the search request is unclear or difficult to determine category, e.g., "I'm an Opera lover", "book". 2.9%

Clough et al., (2017) also created a taxonomy to categorise information use; to create new work (37.1%), personal interest (27.5%), professional activity (20.8%), teaching (7.9%), Ambiguous/unclear (6.3%) and other (0.4%). This is particularly interesting as many institutions have adopted OpenGLAM principles (http://openglam.org) with open licensing actively encouraging reuse (Mahey et al., 2019; Terras, 2015b). For example; The 'Rijksstudio' gained international attention in 2012 for facilitating the sharing and the creative use of digital collection of the Rijksmuseum (Rühse, 2017). More recently the British Library Labs provides prizes for research, commercial, artistic and teaching reuse of their digitised collections (British Library, 2019) and Smithsonian Open Access with 3 million 2D and 3D digital items for download, sharing and reuse (Smithsonian, 2021). There are a range of questions around the use and reuse of digital collections which is out of scope of this work; for an overview see Terras et al., (2021). However, developing user categories based on end use and re-use of the collections could be avenue for further work. With the caveat, as Terras et al., (2021) point out, in a time of continued financial difficulty for the sector, attempting to unlock the new values and users associated with these activities may not be a high priority.

Chowdhury (2015) emphasises the challenge of user study research on Europeana's diverse audience; identifying an extremely broad and unspecific target user group (Chowdhury, 2015, p. 141) with Walsh et al., (2016b) going on to highlight the shortcomings of attempting to standardise the European citizen userbase. This could be one of the reasons why Europeana have moved to focus more on impact studies of specific elements of Europeana's work, rather than overall online collections. The impact assessment studies do not necessarily define audiences, but do demonstrate a shift in thinking towards impact and value and not only use. For example, impact assessment studies have been undertaken on Transcribathon crowdsourcing platform (McNeilly, 2020) with a focus on young people (school students 16 – 18 and post-secondary students from 18), and Europeana Migration thematic collection (Europeana, 2019).

ENUMERATE Observatory

As part of the ENUMERATE project, whose aim is to create a reliable baseline of statistical data about digitisation, digital preservation and online access to European cultural heritage, the 2017 Core Survey (Nauta et al., 2017) highlighted an average of 49% of institutions monitor the use of their digital collections. In previous surveys Core Survey 1 in 2011 on average 42% of all institutions monitored the use of the collection. In Core Survey 2 in 2013 it increased to 51%. In Core Survey 3 in 2015 the overall percentage was 52%. All ENUMERATE Core Surveys ask how the use of the digital collections of their institution is measured. The outcomes for this question are fairly consistent, with website statistics being widely used to measure the use of the digital collections. 90% of the institutions that measure digital access use web statistics. This is equal to the percentages found in 2013 and 2015. The same question in Core Survey 1 in 2011 resulted in a use of web analytics of 85% of the responding institutions. User studies in comparison in the 2017 survey account for 23% (2015 20%; 2013 24%; 2011 16%) (Nauta et al., 2017, p. 38). When split by GLAM organisation type; Libraries make use of user studies the least with 18% and Archives the most with 28%.

DigitaltMuseum, Norway

Work by Gran et al., (2019) explored a multidimensional approach to the diversity of DigitaltMuseum users as part of a wider Digitisation and Diversity project. A survey on digital consumption with 1,500 respondents, Google Analytics data and a user survey of 249 DigitaltMuseum users were analysed. Within the user survey a range of demographic questions were used, in conjunction with questions on motivations and end-use. Gran et al., (2019, p. 72) do state that assessing diversity is challenging. They determine that the respondents were dominated by older adults with higher education. From their user survey 53% of users were male. The largest user groups are those between 40 and 50 years old (28%), followed by 50–60 year olds (24%). 78% of survey respondents were educated to degree level or beyond, this is contextualized, 33% of the Norwegian population are educated to degree level or beyond. With Ethnic and national minorities being underrepresented compared to their actual share of the Norwegian population.

Motivational user categories are described; with the majority of users falling within the 'private capacity' category (80%). This category is similar to the personal interest category used in many UK studies. This is followed by a 'work related purposes' category (34% of respondents), Among those using DigitaltMuseum in the context of their work (N = 84), the majority (63%) reported 'museum work' as the intended purpose. The most significant non-museum categories were work-related

'historical research on places' (26%), exhibitions (25%) and teaching (19%). The final two motivational categories are less prevalent; Higher education and other studies (11%) and school work (2%).

Gran et al., (2019) acknowledge the limitations of this study with a focus on the characteristics of DigitaltMuseum 'super-users', or simply those more likely to respond to online surveys. This is a recurrent feature of online cultural heritage user studies, as noted by Skov and Ingwersen (2014, p. 92), and online surveys more generally (Bethlehem, 2010).

Within the published and unpublished material collated during this literature review – no work explicitly focuses on user diversity and digital collections. The notion of diversity in digital collection audience research tends to be tied to demographics, and efforts to expand it are accordingly targeted at specific population groups that are often underrepresented, typically young people (e.g. McKinney et al., 2020) and persons with disabilities (Darvishy & Manning, 2020). Future work on the area of audience diversity and digital collections should be explored.

Summary

Although much is known about users of GLAM digital collections across Europe (Clough et al., 2017; Europeana, 2014; Nauta et al., 2017) and the US (Romeo, 2016; Villaespesa, 2019), further research is needed to find out the extent of user studies, and audience segmentation and indeed the extent of collections digitisation practice of GLAM organisations at an international scale. For example, Kizher et al., (2019) highlight that a major part of Russia's digital cultural heritage is inaccessible for public use.

Section 6: Identifying Non-users of UK Online Collections

Set against the volume of audience categories, there will always be audience absences. The Scottish Network on Digital Cultural Resources Evaluation (Economou, 2016) highlighted in 2016 that there is an important gap in our understanding of who uses (and who does not use) digital cultural heritage, how these are being used and what the impact and value of these interactions are. More research and work is needed to investigate these questions. The empirical problem about identifying the 'non-users' of digital cultural heritage activities is that non-users are typically underrepresented in research on audience practice (Heikkilä, 2020).

Recent scholarship has suggested that it might be useful to consider physical cultural heritage participation as a factor for non-use (Heikkilä, 2020; Mihelj et al., 2019). Mihelj et al., (2019) point out that online cultural heritage participation might reproduce exactly the same hierarchies and inequalities that already exist in physical cultural heritage participation. Their research examining the UK Government's Taking Part Survey data on digital media and cultural participation in the UK between 2005/2006 and 2015/2016 highlights that belonging to lower occupational classes, not being educated to a degree level, having a disability or long-standing illness and living outside of London remain strong predictors of non-use, ethnicity also has a strong negative effect on usage (Mihelj et al., 2019).

Firstly focusing on audience demographics, Frankly Green + Webb Insight for Change (2020) work identify some gaps in online audiences. Echoing the participation patterns of physical cultural heritage, current online audiences are dominated by those who are:

- Highly educated (degree or higher)

- already engaged with the institution

- female

- white

This is supported by the Audience Agency Digital Audience Survey (2020) who highlight that online audiences are more likely to be white (91%), over 55 (47%) and be female (71%). The Audience Agency go on to suggest that the age profile of digital audiences has lower proportions (18%) of younger audiences (16-34 year olds), both in comparison to the UK population and the Audience Finder benchmark. When the sample is split by organisation type, its apparent that: Museum and Heritage organisations attract 14% 16-34 year olds and Galleries attract 17% (The Audience Agency, 2020, pp. 6–9). Mihelj et al., (2019) agree, stating that age inequalities are considerably more pronounced in the digital collections than offline, particularly so when combined with ethnic minority membership.

In terms of ethnicity 3% of digital audiences identify as mixed or multiple ethnic background, 3% Asian or Asian British and only 1% Black or Black British. Work on audience profiling as part of the Locating a National Collection (Research Bods et al., 2021) highlight similar findings in terms of diversity. 81% of the 992 people interviewed identified as White British. Only 6% identified as Black,

Asian and minority ethnic. As mentioned earlier, no work within this study period (2015-2021) explicitly focuses on user diversity and digital collections. Work by Martinez (2020), focusing on increasing non-white audiences in the US, suggests that the limited studies that do exist explicitly indicate that ethnicity has a huge impact on audience engagement and use, but it is difficult to study audience participation among non-white audiences when they have opted out (Martinez, 2020). This work focuses on physical audiences, but the same appears to be true with digital audiences. Nevertheless, there have been some indications of positive change recently, however: data from the Digital Audience Survey respondents identifying as Black, Asian and minority ethnic were more likely to have discovered new forms of online art and culture over the 2020 COVID-19 Lockdown periods (The Audience Agency, 2020). Suggesting adaptation during this pandemic has presented some sort of catalyst for change, which would warrant further investigation to capture opportunities for future engagement with these typically unrepresented groups.

Recent guidance from UNESCO highlights that despite the inherent benefits of increased GLAM online collections, digital content frequently remains inaccessible to persons with disabilities – particularly to those with vision, hearing, motor, or cognitive impairments (Darvishy & Manning, 2020, p. 2). The report provides a positive example of the Sarjeant Gallery of New Zealand, who have incorporated accessibility into their online collection, with each item accompanied by a text description of its key features. However, the Audience Agency data suggests that 12% of respondents identify as having a disability who are actively engaging with online cultural heritage content (The Audience Agency, 2020). Suggesting the impact of the GLAM pivot to digital during the COVID-19 pandemic has started to change cultural heritage digital engagement of previously underrepresented user groups. Samaroudi et al., (2020) indicate that the COVID-19 pandemic has enabled the sector to identify less traditional audiences who want to engage through digital mechanisms, in particularly audiences with needs closely link to societal developments during the pandemic: these include anti-racism activists, people with dementia, and audiences characterised through their social condition (vulnerable, isolated, lonely, bored) rather than their identity or interests, and those for whom digital may not be an easy or obvious means of communication.

It is important to note that this does not necessarily mean that non-users are not currently identified and engaged with by organisations. Indeed, diverse audiences are engaged with by cultural heritage organisations through specific programmes. Rather, in segmentation terms, there appears to be a lack of categorisation of non-users, there may well be audiences, but they might not be recognised as such within the approaches and models of arts audience segmentation. For example, Hauswedell et al., (2020) suggest that rather than the term 'non-user', audiences could be thought of as 'yet to be discovered user groups' (2020, p. 154) which could include; creative industries, fashion students, crime writers, food and drink writers, app developers, sports enthusiasts (2020, p. 154)

Section 7: Discussion

The user studies reviewed in this research show, despite a slowing in academic discourse in the UK since 2015, there is still an ongoing commitment to better understand digital audiences in the GLAM sector.

Across the published and unpublished material a variety of different approaches to data collection can be seen. Some research focused on log analysis (Gooding, 2016; Walsh et al., 2019), contextual enquiry (Power et al., 2017) or user testing (Wusteman, 2017). While others implemented short online surveys (Stack & Villaespesa, 2015; Villaespesa, 2014), or used longer questionnaires (Art UK, 2018; Walsh et al., 2020). Several studies used a combination of quantitative and qualitative approaches (Coburn, 2016; Fildes, 2020a; Research Bods et al., 2021). One study combined interview, diary studies and usability research alongside analytics (Phillips-Bacher, 2021). When categorising users the studies broadly can be separated into two clear segmentation devices; groupings based on motivation and groupings based on level of expertise or role. With mode of interaction starting to emerge as an approach to categorisation. Some studies specifically focused on online collections (e.g. Craig, 2019; Gooding, 2016; Villaespesa, 2014), and other research looked more widely at the organisational website(s) and/or social media usage as a whole (e.g. Art UK, 2018; Frankly Green + Web, 2020; Stack & Villaespesa, 2015; Walsh et al., 2020). It is also important to note that some studies focused on individual 'users', but as Gooding (2016) articulated particularly when using analytics and web log analysis, user identification is unreliable. Other studies examined the 'visit mode' (Stack & Villaespesa, 2015), where the visit is categorised and not the user. Using motivation and mode of interaction as segmentation tools enables users to play multiple roles in relation to a digital collection. The same individual user could visit a digital collection on multiple occasions but with different objectives and goals.

A key aim of this review was to identify the types of current users of GLAM digital collections. It is clear that a range of user types access and use digital collections. Users have been categorised in a myriad of different ways; there are similarities in the terminology of the categories used, but a lack of consistency in naming categories across the sector. There are four key approaches to categorising users within the published and unpublished literature: groupings based on motivation; level of expertise or role; mode of interaction and web analytics. The literature suggests that it is difficult to identify categories of 'non-users' of digital collections due to non-users typically being underrepresented in audience research. It has also been suggested digital collection non-users may follow the same participation patterns of physical cultural heritage (Mihelj et al., 2019); this does appear to be the case with research highlighting that younger audiences, non-white, lower occupational classes, not being educated to a degree level, having a disability or long-standing illness and living outside of London have a strong negative effect on usage.

Key findings

Limited available audience research

While a range of work on digital audiences exist, in depth empirical research does appeared to have slowed since 2015. There could be a range of reasons for this downturn in research, however lack of adequate funding and resource to undertake robust research has been raised across the sector (Basili, 2018; L. M. Hughes, 2012; L. M. Hughes et al., 2015; Peterson, 2018). GLAM organisations do capture digital audience data; for example, comprehensive monthly quantitative data is collected by all Department for Digital Culture, Media, and Sport (DCMS) sponsored museums and galleries in an attempt to reflect the quality and effectiveness of their digital collections. All data is collected according to the DCMS performance indicator guidelines, but data collection methods vary between institutions, and each uses a method appropriate to its situation. This focus on quantitative reporting lacks detail and nuance in terms of audience behaviours. Leading to a lack of richer and deeper understanding of digital users, particularly with regards to Archives as Hauswedell et al., (2020) attest to; "the end user is not often emphasised in the wider literature on archival studies and we thus draw attention to the potential merit of this vector in future studies of digital archives" (2020, p. 139). There was also the additional challenge of access to unpublished material, with some organisations citing confidentiality of internal documentation. A move to increase transparency and sharing across the sector could help with standardisation of digital collection audience research processes.

Generic user categories

Across all approaches to categorisation of digital collection users, fairly broad segments are utilised, providing an abstract profile of user behaviours. The selection of user categories typically reflects the purpose of the research, so it is difficult to make accurate comparisons across studies. There are questions around how meaningful user categories such as 'general public' and 'personal interest' can be. The literature is quite vague on who and what these categories actually entail. Walsh et al., (2016b) argue that it is unclear to what extent a standardised and generic set of user categories can be developed across the GLAM sector. Research available in the study period of 2015-2021 focuses on specific collections and research projects. Morris Hargreaves McIntyre (n.d.) and the Audience Agency (n.d.) have produced more generic audience segmentation profiles based on cultural values, independent of specific cultural heritage organisations, collections, systems and situations, which goes some way to provide a shared approach to understanding audiences. These models are not dedicated to digital collections, instead looking at a broad spectrum of cultural heritage and arts activities. Frankly Green + Webb have started the process of applying standardised categories across organisations with a specific focus on digital audiences, using motivation as a driver (Frankly Green + Web, 2020). It would be interesting to explore a combination of user dimensions; role, level of expertise, motivation, mode of interaction to create more standardised and consistent user categories across the sector.

COVID-19 audience segmentation

A series of audience segmentation approaches have also been devised in response to the impact of COVID-19 on the cultural heritage sector (Jones, 2020; Samaroudi et al., 2020; The Audience Agency,

2021b). This segmentation considers the shift in the character of audience needs to prioritise the distinctive emotional and social needs created by the pandemic lock-downs. Leading the Audience Agency to suggest that there are indications that audience behaviour will be 'different in the 'new-normal' after the pandemic' (2021a), particularly in relation to greater digital engagement.

Moving towards Impact and Value

Wider literature on digital cultural heritage and audiences suggests a shift away from user behaviour towards impact and value of digital collections and projects. For example; Europeana's work on impact studies (Europeana, 2019; McNeilly, 2020) and the role digitised collections can play in providing benefit for 'social good' and 'social purpose' (Malde & Kennedy, 2018). Terras et al., (2021) consider mass-digitised heritage content as a vast resource with economic value.

There has also been a growth in bespoke digital resources and projects as standalone endeavours or a series of projects relating to the digital collections. Crowdsourcing, in particular, has been increasingly explored (Bonacchi et al., 2019; Hedges & Dunn, 2017; Ridge, 2016; Terras, 2015a). Although research suggests that only a small number of 'super users' (very engaged enthusiasts) make up the large percentage of users and contributors (A. Eveleigh et al., 2014; A. M. M. Eveleigh, 2015; Wrigglesworth & Watts, 2018).

Section 8: Conclusion

The purpose of this review was to explore the relevant literature in order to identify the ways in which users of cultural heritage digital collections have been categorised. There was a key focus on UK GLAM collections, complimented by a selection of international studies. Across all approaches to categorisation of digital collection users, fairly broad segments are used, providing an abstract profile of user behaviours. Two clear segmentation devices are used; groupings based on motivation and groupings based on level of expertise or role, with mode of interaction starting to emerge as an approach to categorisation. Analytics still appear to be the default tool for data capture. It would be interesting to explore a combination of user dimensions; role, level of expertise, motivation, mode of interaction to create more standardised and consistent user categories across the sector. It has also been possible to identify a range of user types who are not currently using UK digital collections which appear to reproduce similar participation hierarchies and inequalities that already exist in physical cultural heritage settings. This work contributes to our understanding of types of current users and their behaviours with Gallery, Library, Archive and Museum digital collections. This understanding should help in the future design of digital cultural heritage collections.

It is clear that while a range of digital collection audience research exists, more work is needed in this area. This literature review has highlighted that in depth empirical research has slowed since 2015, leading to a lack of richer and deeper understanding of digital users. Previous research has also indicated that the role of the user, and the continuum of user needs, expectations and perspectives requires further study (Dobreva et al., 2012; Economou, 2016; Gooding, 2017; Hauswedell et al., 2020; Hughes, 2012; Walsh et al., 2016a). We believe that there needs to be sustained investment in digital audience research and support to encourage sharing and transparency across the sector. As Lorna Hughes advocated in 2012 in order to fully embed use, value and impact into the future development of cultural heritage digital collections, more strategic input from funders would be required (Hughes, 2012), particularly the need for digital collection projects to take a more robust approach to evaluating and demonstrating the value, impact and use. Hughes goes on to suggest that value, impact and use of collections take time to develop, and this needs to be reconciled in a world of responsive, short-term funding opportunities.

A key area for future research is with current 'non-users' or as Hauswedell et al., suggest 'yet to be discovered user groups' (2020, p. 154). Of interest in this area is more focus towards vulnerable audiences. A deeper understanding of needs and requirements of this audience type could be beneficial in digital collection audience development. Particularly as the literature suggests that during and following the pandemic there is an increased interest in the role that Digital Collections could have in supporting audience's health and wellbeing (Samaroudi et al., 2020; The Audience Agency, 2021b). There has been a range of work focusing on the health benefits provided by GLAM physical spaces and collections (Chatterjee & Noble, 2016; Fujiwara et al., 2015), but very little research on the health and wellbeing benefits of digital GLAM collections. In such efforts, it would be important to consider the interest, activities, requirements and digital capabilities of these audiences to avoid digital exclusion.

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Appendices

Appendix A: Zotero Library

Zotero Library containing details of the published material collected for this literature review

https://www.zotero.org/groups/4482649/digital_cultural_heritage_collections_audience_research/

Appendix B: List of User Categories identified in Literature

Cultural Heritage Organisation	User Categories/Audience Segments	Year	Reference
Tate	Personal interest research Student research Professional research Inspiration Enjoyment Art News Repeat visit planning First time visit planning Organisational information	2015	Stack, J., & Villaespesa, E. (2015). Finding the motivation behind a click: Definition and implementation of a website audience segmentation MW2015: Museums and the Web 2015. MW2015: Museums and the Web 2015. Museums and the Web 2015.
Welsh Newspapers Online	Information Seeking Behaviour – Researchers	2016	Gooding, P. (2016). Exploring the information behaviour of users of Welsh newspapers online through web log analysis. Journal of Documentation, 72(2), 232–246.
General Digital Cultural Heritage	Curiosity Work Plan visit Pleasure Learn captive Learn non-captive	2016	Walsh, D., Clough, P., & Foster, J. (2016). User Categories for Digital Cultural Heritage. ACHS 2016 Accessing Cultural Heritage at Scale Proceedings of the First International Workshop on Accessing Cultural Heritage at Scale Co-Located with Joint Conference on Digital Libraries 2016 (JCDL 2016), 9.
TWAM	Cruising Digging Sharing	2016	Coburn, J. (2016). I don't know what I'm looking for: Better understanding public usage and behaviours with Tyne & Wear Archives & Museums online collections	MW2016: Museums and the Web 2016. MW2016: Museums and the Web 2016.
National Liverpool Museums	General Public Non-Professionals Students Academics Teachers Museum Staff	2017	Walsh, D., Hall, M., Clough, P. D., & Foster, J. (2017). The ghost in the museum website: Investigating the general public's interactions with museum websites. 434–445.
Letters of 1916 Digital Edition	General Public General Public retired volunteer General Public Volunteer Traditional Academic Digital Humanist	2017	Wusteman, J. (2017). Usability testing of the Letters of 1916 Digital Edition. Library Hi Tech, 35(1), 120–143.
Archaeological Data Service	Archaeologists	2017	Power, C., Lewis, A., Petrie, H., Green, K., Richards, J., Eramian, M., Chan, B., Walia, E., Sijaranamual, I., & De Rijke, M. (2017). Improving archaeologists' online archive experiences through user-centred design. Journal on Computing and Cultural Heritage, 10(1).
Science Museum (UK)	Studying school Studying University Teaching Personal interest Professional interest	2018	Fildes, E. (2018). How audiences discover the Science Museum Group Collection. Science Museum Group Digital Lab.
Art UK	For personal interest or research Student: Secondary (up to 16) Student: Further Education (16+) Teacher/Tutor: Primary Teacher/Tutor: Secondary (up to 16) Teacher/Tutor: Further Education (16+) Teacher/Tutor: Higher Education (18+) Other academic Reason Professional Research: Art Trafe Professional research: Museum curatorial Professional research: Other	2018	Art UK. (2018). Art UK webiste and social media survey 2018 [Unpublished]. Art UK.
Scottish Council on Archives	genealogists, researchers, academics, students, historians and members of the public	2018	Pelan, J. (2018). Accessing Scottish Archives Online. Genealogy, 2(4).

V&A	Modes of interaction: Understand Explore Develop Research	2019	Craig, J. (2019, August 16). How are the V&A's online collections used? V&A Blog.
Bodleian Libraries	browsers followers searchers Students Academic researchers	2019	Siefring, J. (2019). Democratizing Discovery: The Impact of Digital Culture on the Research Library. In T. Giannini & J. P. Bowen (Eds.), Museums and Digital Culture: New Perspectives and Research (pp. 491–506). Springer International Publishing.
Archaeological Data Service	Archaeology research community - roles	2019	Guntram, G., & Wright, H. (2019). D2.1 Initial Report on Community Needs. ARIADNEplus.
VISE Interfacre (using NMS & Rijksmuseum collections)	Domain knowledge & Demographics	2019	Usman, M. A., & Antonacopoulos, A. (2019). VISE: An interface for visual search and exploration of museum collections. Journal on Computing and Cultural Heritage, 12(4).
National Museums Liverpool (UK)	Single page viewers High all round searchers Event visitors Single query general page visitors Deep level browsers General museum visitors Known item searchers	2019	Walsh, D., Clough, P., Hall, M. M., Hopfgartner, F., Foster, J., & Kontonatsios, G. (2019). Analysis of Transaction Logs from National Museums Liverpool. Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics), 11799 LNCS, 84–98.
National Museums Liverpool (UK)	General Public Non-professional Student Other Teacher Academic Museum staff	2020	Walsh, D., Hall, M. M., Clough, P., & Foster, J. (2020). Characterising online museum users: A study of the National Museums Liverpool museum website. International Journal on Digital Libraries, 21(1).
Science Museum (UK)	Studying school Studying University Teaching Personal interest Professional interest	2020	Fildes, E. (2020, March 23). Using audience insights to improve the Science Museum Group collection stories online. Science Museum Group Digital Lab.
8 UK organisations as part of FG&W Insight for Change Research	Understanding the Experience Research Curiosity Practical Planning Education Commercial Development Support Other	2021	Frankly Green + Web. (2021). Insight for Change. Frankly Green + Webb.
Wellcome Archives	Experienced library users, New library users User intentions	2021	Phillips-Bacher, J. (2021, April 30). What are you thinking when searching our collections? Medium. https://stacks.wellcomecollection.org/what-are-you-thinking-when-searching-our-collections-5481d3341d36
Wellcome Archives	internal archivists external archivists, researchers librarians	2021	Richmond, A. (2021, January 4). Navigating Wellcome's Archives Online. Medium.
National Archives	Historians	2021	Dunley, R., & Pugh, J. (2021). Do Archive Catalogues Make History?: Exploring Interactions between Historians and Archives. Twentieth Century British History, hwab021.
National Museums Liverpool (UK)	Online Researchers CH enthusiasts Local visiting workers Regular website visiting local workers Local enthusiasts First-time non-local workers	2021	Walsh, D., Clough, P., Hall, M., Hopfgartner, F., & Foster, J. (2021). Clustering and Classifying Users from the National Museums Liverpool Website. Linking Theory and Practice of Digital Libraries, Proceedings of TPDL 2021.
Locating a National Collection project	Group A: High interest in History/Heritage, High tech engagement/competence. Group B: High interest in History/Heritage, Mid tech engagement/competence. Mid interest in History/Heritage, High tech engagement/competence. Group C: Mid interest in History/Heritage, Mid tech engagement/competence. Group D: High interest in History/Heritage, Low tech engagement/competence. Low interest in History/Heritage, High tech engagement/competence Group E: Mid interest in History/Heritage, Low tech engagement/competence. Low interest in History/Heritage, Mid tech engagement/competence. Low interest in History/Heritage, Low tech engagement/competence	2021	Research Bods, Hunt, A., Vitale, V., & Rees, G. (2021). Locating a National Collection. Digital Heritage Audience Profiling [Unpublished].

Appendix C: Synonyms and alternative terms for major search terms

Audience research, digital collections, cultural heritage, online users

Audience Research	Digital Collections	Cultural Heritage
Visitor Studies	Digital Cultural Heritage	Museums
Online Users	Digital Heritage	Libraries
User Modelling	Digital Humanities	Archives
User Studies	Online Collections	Galleries
Audience segmentation	Online Catalogues	GLAM
Online visitors		
Online metrics		
Audience evaluation		
Online User Behaviour		
User Groups		