Archive workers' information needs and how their expert knowledge influences information searching and collection curation: an interview study

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Abstract

Introduction. The paper makes a call for research on archive workers, including archivists as archive users, and reports indicative findings of a study of archive workers' information searching and curation of cultural heritage archives. The study is part of a European research project concerning user access to digital cultural heritage archives, from a post-colonial perspective.

Method. We have conducted semi-structured interviews with five archive workers who work as scholars, as archive curators, and as mediators of archive content. All interviews were conducted in English, online, and were audio-recorded and transcribed.

Analysis. The study explores three research questions: 1) what characterises the archive workers' information needs?; 2) how does the archive workers' expert knowledge influence their information searching?; and 3) how does the archive workers' domain knowledge, in the form of post-colonial knowledge, influence the curation? The interview data are analysed by use of a qualitative thematic analysis method.

Results. The archive workers' information needs are characterised by topic, domain, and purpose. Further, the needs are work-related and illustrated by searching for their own research projects, intermediary searches on behalf of users, and searching as part of collection curation. They make use of numerous types of expert knowledge (collection knowledge, archival intelligence, artefactual literacy, and post-colonial domain knowledge) that influence their information searching and curation. Additionally, curation and information searching are affected by the quality of metadata, stemming from the colonizers' perspective.

Conclusions. This paper contributes novel insights about archive workers' information seeking behaviour, their handling of different types of information needs, user mediation, and collection curation, based on post-colonial knowledge and hence supports the call for future research on this topic.

Introduction

This paper reports results from interviews with persons who work in digital cultural heritage archives. The interviews were conducted as part of a European interdisciplinary research project, called Polyvocal Interpretation of Contested Colonial Heritage (PICCH), concerning user access to digital cultural heritage archives from a post-colonial perspective. The overall aims of the project are to identify key instances of colonial audio-visual heritage across the archives involved and open a dialogue between the archives and the user communities. It is thus vital to address the issue of how cultural heritage collections, as data created in a colonial mindset, can be reappropriated and reinterpreted critically. The PICCH project has research partners from four different European universities and one speech-technology company in five different European countries and archive partners from three European countries.

As partner in the project, our objectives are to look into who the users of the archives are, the information needs they have, and how the users search the archives. We have interviewed eleven users. In this study we will address a specific subset of these users, namely the archive workers. Five of the users played three roles, being curators of the archives; mediating the content of archives to end-users; as well as being scholars who use the archive material for their own research. This constitutes a small, but rarely studied group of archive users, which are often not considered a user group in their own right, not even by themselves. Therefore, we make a call for research on this user group, including archivists as archive users. Our study is steered by the following three research questions:

1. what characterises the archive workers' information needs?
2. how does the archive workers' expert knowledge influence their information searching?
3. how does the archive workers' domain knowledge, in the form of post-colonial knowledge, influence the curation?

The five interviewees all work in cultural heritage archives, but none of them have a degree in archival science. Therefore, based on advice from one of the reviewers we have decided not to use the term *archivist*. All of them have, however, master's or doctoral degrees in their respective fields (*e.g.*, anthropology and ethnomusicology) and at the time of participating in the study they filled positions in the institutions' archives in which central work tasks included curation of and interaction with digital cultural heritage collections. In the following analysis they are referred to interchangeably as archive workers, scholars, curators, participants, and interviewees.

We acknowledge that five participants constitute a small sample. They do, however, represent an understudied group of archive users, which we believe is of value to learn more about. The participants serve three distinct functions or occupy different roles as curators, mediators, and scholars, and combine different types of expertise in their work. In the role of curators, they manage collections that contain documents and objects that provide evidence of actions or decisions. Being scholars, they use the content of the collections in support of their own research projects. Finally, as mediators, through their reference activities, they help and support users in their search for information in the archives and help them locate relevant material. Thus, we hope that the results we report are sufficient to shed light on the interesting interplay of the different types of expertise that the participants possess; expertise in archival work, collection knowledge, and domain knowledge to support the call and motivate future research.

We define curation as the collection, selection, and organisation of objects in cultural heritage collections for long-term storage. Such collections are typically held by archives or other GLAM (galleries, libraries, archives, and museum) institutions, which use specific information systems for storage and retrieval of metadata, and increasingly digital objects. The latter may be digitised versions of analogue objects, or born-digital objects. The quality of GLAM information systems depend on their ability to secure metadata quality and facilitate metadata interoperability

(Mitchell, 2013), and the use of semantic technologies, such as the CIDOC-Conceptual Reference Model (CRM) and Linked Data to make the data findable, accessible, interoperable and reusable (FAIR) (Wilkinson *et al.*, 2016; Vlachidis *et al.*, 2021).

We adopted a thematic analysis technique (Braun & Clarke, 2006) to uncover the nuances of how archive workers' expert knowledge, in particular, their collection knowledge, domain knowledge, artefactual literacy, and archival intelligence, have contributed to the use of cultural heritage collections as data. The interviewees shared their reflections and experiences working with the collections, providing insight into their information needs, search behaviour, collection curation, and their use of the archives for research purposes.

With a background in library and information science, we investigate how archive workers interact with the collections, from two perspectives. First, we are interested in their information needs and how they search in the collections, including the topics, domains, and purposes of their information needs and how their searching is influenced by their expert knowledge on the archives. Second, we want to learn more about their curation of material and how this is influenced by their domain knowledge on colonialism.

The remainder of the paper is structured as follows: the *motivation* section describes our theoretical background in library and information science; the *background* section sets the scene concerning related research with respect to the themes of the three research questions. The *method* section outlines how data was collected via semi-structured interviews and then subjected to qualitative thematic analysis. The *result* section reports the findings in accordance with the three research questions, followed by a discussion of the findings. The paper closes with concluding remarks.

Motivation

As discussed, we are positioned in the field of library and information science, more specifically within the subfield of information behaviour. Our aim in this paper is to investigate the information behaviour of persons who identify themselves as both archivists and scholarly users of archives. Our study aims to learn about the information needs of this group of users and how they activate information behaviour. In addition, we want to learn about the contexts that influence such behaviour, in particular the users' background knowledge in the form of different types of expert knowledge. Information behaviour can be divided into information seeking behaviour and information searching behaviour (Wilson, 1999), where the latter, to a large degree, overlaps with the research area interactive information retrieval. Information seeking behaviour denotes purposive seeking in formal and informal sources to satisfy an information need, information searching being a subset of seeking, which covers users interacting with digital information systems to satisfy information needs or solve work tasks (Wilson, 1999).

In addition, from a library and information science perspective, it is interesting to enhance our knowledge of cultural heritage collection organisation and development by learning more about archive expert knowledge and how this affects persons interacting with archives as users and curators. Archival intelligence (Yakel & Torres, 2003) is particularly interesting, which is defined as "*a researcher's knowledge of archival principles, practices, and institutions, such as the reason underlying archival rules and procedures, the means for developing search strategies to explore research questions, and an understanding of the relationship between primary sources and their surrogates*" (Yakel & Torres, 2003, p. 51). We interpret archival intelligence to include knowledge about, what is known in the library and information science as the principles of knowledge organisation (*e.g.*, Hjørland, 2008) used for the archive, as well as how they are applied for individual archives. Archival intelligence thus covers knowledge about the indexing principles that serve as *entry points* to get access to specific archive material. Hence, archival intelligence helps with search strategy formulations, a central step in the information behaviour process. In this

context, it is important to notice the differences between library and archival settings with respect to what Duff and Fox (2006) termed the '*unique challenges faced by reference personnel in archival setting [...] often attributed to the provenance-based arrangement and description systems, poor finding aids, time limitations, and a division between reference and description roles*' (Duff & Fox, 2006, p. 131). An important reason for these differences being that libraries contain more homogenous collections of items, *i.e.*, primarily documents in the form of books and journals, than cultural heritage archives. The archives in which our participants work contains artefacts such as clothing and maps, video and audio recordings, still images, and other types of documents. Archives also serves different purposes than libraries, as emphasised by Welland (2022) who discusses expert users perceptions of purpose:

> *created purpose (it is what it is), intended purpose (it is what the creating or host organisation attests it as), articulated purpose (it is what the archival organisation presents it as) and projected purpose (it is what the user signifies it as)* (Welland, 2022, p. 61).

Background

We have structured this section so that the theoretical background and previous research are related to our three research questions. Thus, we present first literature on information needs, thereafter literature on archive expert knowledge in general, and finally literature on a specific type of expert knowledge; how domain knowledge about post-colonial theory affects archive curation.

Information needs

We address the concept of information need from the perspective of library and information science, which has a long tradition for the handling of information needs, as exemplified with the two iconic papers by Taylor (1962, 1968) in which he put forward the hypothesis about four levels of information needs; from an early inexpressible notion that a need exists, to the information need being expressed in a way that is suitable for the information system or an information professional. Belkin and his colleagues (1982) were strongly inspired by Taylor in the conceptualisation of the anomalous state of knowledge (ASK) hypothesis concerning how something (information) is required to solve a problem, or resolve an anomaly. This again related to Wersig's (1971) problematic situation and problem-solving. Ingwersen is relying on the work by Belkin and Wersig which he based on observation of dialogues between users and librarians in public libraries (Ingwersen & Kaae, 1980; Ingwersen, 1986, 1996, 2000), identifying three types of information needs: verificative, conscious topical, and muddled topical information needs. Borlund and Pharo (2019) adapt Ingwersen's three types of information needs in their operationalisation of information needs to consist of three dimensions: topics (what are you going to find information about?), domain (why are you interested in this information?) and purpose (what are you going to use the information for?). They analysed a sample of eighty-seven genuine information needs, finding that '*nuances and depths of the information needs are best understood in the light of the domain and purpose, because they add insight about the context of searching and the motivation for searching*' (Borlund & Pharo, 2019). In line with this we are interested in identifying the topics, domains, and purposes of the archive workers' information needs and hence understanding why and how these users search for information.

Previous literature sheds little light on the information needs of persons who work in archives as curators. However, the information needs of potential users of archives and how archivists could help supporting their needs are documented, *e.g.*, by Goodman (1993), who have reviewed decision makers' information seeking and how archivists and record managers may help them to clarify their information needs. Tibbo (1995) also has this angle in her article on interviewing techniques for remote reference interviews. Here she discusses how communication between archivists and users would change as archival material as well as communication channels are digitised. She

compares archive reference interviews with Taylor's (1968) note that revealing a user's information need is '*one of the most complex acts of human communication*' where '*one person tries to describe for another person not something he knows, but rather something he does not know*' (Taylor, 1968, p. 180). The digital setting lined up by Tibbo, which also includes digital finding aids, does not change the role of the archivist, whom she still sees as an interpreter that should help users articulate their information needs. This is mirrored in a study by Johnson (2008), who finds that to make the best use of archival resources, archivists often need to help users by mediating their information needs. Duff and Fox (2006) have interviewed thirteen archivists about their archival reference works. They report that archive reference interviews are concerned with the topicality of users' information needs, the users' background knowledge, time and place related aspects, and the purpose of the users' research. Recently, Duff and her colleagues have suggested a new '*relationship-based access framework*' (Duff *et al.*, 2024, p. 108) to steer the interaction between archivists and archive users '*grounded on the theoretical construct of an ethics of care*' (Duff *et al.*, 2024, p. 108). The framework will support users '*who study difficult histories or [come] from underrepresented communities*' (Duff *et al.*, 2024, pp. 108–109).

Since neither archivists, nor other archive workers', information needs are covered in previous research, it is natural to review the role of such users and their information behaviour, in general. According to Huvila (2015) little attention has been paid to studies of archival work itself (Huvila, 2015), neither has archive workers' own *archival interaction*, as phrased by Duff and Yakel (2017), been systematically investigated. In Rhee's comprehensive review of archival user studies in North America, she identified studies of "*information seeking' as being the 'most popular topic*" (Rhee, 2015, p. 33). According to Rhee, historians stand forward as the most common users to be studied, in addition, genealogists and students appear to be other groups that have received some attention. Rhee reports no studies of the archivists, or other archive workers', own use of the archives.

Duff and Johnson conducted interviews with ten historians, and found that this group typically performs four types of information seeking activities in archives: '*(1) becoming oriented to a new archive or collection, (2) searching for known material, (3) building contextual knowledge, and (4) identifying relevant material*' (Duff & Johnson, 2002, p. 492). Kirkegaard Lunn (Kirkegaard & Borlund, 2008; Kirkegaard Lunn, 2009) found similar patterns in his study of user needs in television archives. Duff and Johnson also identified that searchers depend on help from archivists in finding relevant material and that they prefer to start their search with manual finding aids, rather than online tools, because the manual aids are better at giving '*a sense of the whole collection*' (Duff & Johnson, 2002, p. 481). Allison-Bunell, Yakel, and Hauck (2011) interviewed academics, genealogists, administrators, amateur researchers, and students about their searching of archives. They find that the searchers prefer keyword searching over browsing and want to be able to select items based on descriptive metadata related to geography, scope or content, date, copyright, and type or genre. Vilar and Šauperl (2017) interviewed and surveyed archivists about students as archive users. Their study identifies that archivists provide help in offering individual training to the students, who are often inexperienced and impatient and lack competency in formulating precise questions, *i.e.*, their information needs.

Recent studies by Langa and colleagues (Langa *et al.*, 2023) and Weber and co-workers (Weber *et al.*, 2023), in relation to the U.S. project concerning the building of a national finding aid network, known as the NAFAN project, show that the most common information needs can be categorised according to the following five categories: personal interest, family history, professional projects, long-term projects, and local history research (Langa *et al.*, 2023). Subsequent follow up-interviews suggest, more specifically, that the interviewees' information needs are of the types '*addressing information gaps, finding contextual or factual information related to their research topic, identifying evidence to build an argument, exploring a topic and available resources, confirming existing information, or obtaining reproductions of archival materials*' (Weber *et al.*, 2023, p. 6).

To sum up, previous research shows how historians are the most commonly studied group of scholarly users searching archives; archivists play an important role as intermediaries between users and archive collections, but we know very little about the information needs they handle and the archivists and other archive workers' own interaction with the collections.

Archive expert knowledge

As stated above, we are interested in learning about how archive workers use their collections as part of the work practice, *i.e.*, how their expertise influences their interaction with the archive, on behalf of the users, for their own scholarly research, or for curation purposes. Little has been found in the previous literature specifically targeting archivists or other archive workers' expert knowledge, but in a study by Duff and Fox (2006) the authors identified that to provide efficient reference services, archivists needed '*historical knowledge, knowledge of government structure and processes, record forms, collections, major finding aid systems, major creators and how records are produced*' (Duff & Fox, 2006, p. 141). Below we report on literature describing archival expert knowledge, in general, which is necessarily a type of expertise also held by the users we have studied. Archival expert knowledge is described under many names in the literature, including archival intelligence, domain knowledge, collection knowledge and various forms of *literacies*, *e.g.*, artefactual literacy (Allison-Bunnell *et al.*, 2011; Wang & Lin, 2022) and primary source literacy (Hauck & Robinson, 2018). The different names reflect different dimensions of expertise, which will be reviewed in this and the following sections.

Garcia, Lueck, and Yakel (2019) have performed a systematic review of '*the literature on teaching and learning with primary sources*', and have identified '*a total of 244 peer-reviewed publications related to teaching with primary sources dating from 1949 to 2016*' (Garcia *et al.*, 2019, p. 94), with a significant increase of studies from 1999. Their review shows that history is the most common domain within which primary source-oriented teaching and learning is conducted, which is not very surprising. For more than half of the works no academic domain is identified. The authors, however, speculate that it may signify '*that history is the assumed and default field*' (Garcia *et al.*, 2019, p. 95). Other fields that were identified include English, religious studies, political science, architecture, and radio and television studies.

Yakel and Torres (2003) have developed an influential model of user expertise in archives. They interviewed twemty-eight academic users of primary sources, most of whom were from different fields of social science. Based on the interviews the authors categorised archive users' knowledge into three categories; domain knowledge: '*an understanding of the topic being researched*'; artefactual literacy, *i.e.*, '*the ability to interpret records and assess their value as evidence*'; and archival intelligence: the scholars' knowledge about '*archival principles, practices, and institutions; strategies for reducing uncertainty and ambiguity; intellective skills*' (Yakel & Torres, 2003, p. 52). Of particular interest to us are the remarks made by the interviewees concerning the archivists, who they do not see as all-knowing or infallible, but '*most interviewees noted that they relied on the reference archivist and felt confident in the archivist's abilities*' (Yakel & Torres, 2003, p. 67). An interesting challenge is the necessity to calibrate the users' knowledge and needs with the reference archivists' expertise, which, they state, is '*common to both archivists and researchers*' (Yakel & Torres, 2003, p. 68).

Duff, Yakel, and Tibbo (2013) followed up with a study investigating the types of knowledge needed to be a reference archivist. They interviewed archive users, selected relevant data from a survey study with archivists, and analysed archival science educational guidelines. They find that archival reference knowledge can be categorised into research knowledge (which include domain knowledge and artefactual literacy), collection knowledge (*i.e.*, knowledge about the holdings and contextual knowledge about the holdings), and interaction knowledge (which include archival intelligence). The importance of collection knowledge was not touched upon in Yakel and Torres' (2003) study, but this was judged as a very valuable competency to possess by reference archivists.

Both students and professors who were interviewed by Duff, Yakel, and Tibbo (2013) recognise how archivists have directed them to specific material in large collections, explaining what material is not in the collection, and saving them time by steering them towards relevant material and '*away from the wrong place*' (Duff *et al*., 2013, p. 80).

Wang and Lin (2022) argue that the discussions following up on Yakel and Torres' (2003) work on archive expertise has primarily been related to archival intelligence and that there is a need to learn more about how domain knowledge and artefactual literacy influence users. They therefore interviewed master students in history to learn how artefactual literacy-related competences influenced their seeking and use of primary resources. Two main categories of artefactual literacy were identified; abilities to identify the context of the primary sources, *i.e.*, the artefacts, which they name *external criticism-related abilities* and abilities related to interpreting the content of the artefacts, labelled *internal criticism-related abilities* (Wang & Lin, 2022). Domain knowledge, however, was not examined further by Wang and Lin.

Hauck and Robinson (2018) have reviewed literature that documents how archival intelligence (Yakel & Torres, 2003) has evolved into *primary source literacy*. A set of guidelines for primary source literacy are demonstrated to show how they can be used for teaching undergraduate history students '*to critically analyze information and execute primary source research*' (Hauck & Robinson, 2018, p. 217). The importance of and challenges with teaching and establishing archival literacy is a topic addressed by many authors in the last two decades (*e.g.*, Daines *et al*., 2022; Baines, 2023; Huang *et al*., 2023). In a study addressing how to support teaching with primary sources (Tanaka, 2021; Daines *et al*., 2022), researchers found that among the faculty members in one of the universities investigated, only two out of seventeen, had received any '*formal training at any point during their education or their teaching career*' (Daines *et al*., 2022, pp. 856–857). Informal training, often experience-based during their student years was, however, common (Daines *et al*., 2022). In these studies the archivists were recognised as '*providing significant instruction with primary sources*' (Tanaka, 2021, p. 6), but the authors prioritised interviewing lecturers that taught use of archival material as part of their courses, hence not focusing on the archivists' own expertise. Archivists' expert knowledge did, however, appear, *e.g.*, in the following quote referring to collection knowledge: '[*The archivist] knows her materials so well that she could suggest to me some absolutely entirely unexpected primary sources that I would never have even known to look for*' (Tanaka, 2021, p. 11).

Welland discusses four perceptions of purpose related to archival documents in archival organisation:

> created purpose (the archival document is perceived as evidence of an initial task), intended purpose (the archival document is perceived as evidence of actions or decisions), articulated purpose (the archival document is perceived as evidence of a curated account), and projected purpose (the archival document is perceived as evidence of repurposed narrative) (Welland, 2022, p. 61).

She defines *purpose knowledge* as '*an expert user's understanding of the four perceptions of purpose*' (Welland, 2022, p. 67) and states that such knowledge can also

> aid the further development of a user's artefactual literacy and archival intelligence, helping the user to identify potential gaps or bias in content, collection, or cataloguing (such as evidence of unrecognised colonial thinking in archival descriptions) that may cause misunderstanding or feelings of exclusion for some user groups (Welland, 2022, p. 69).

The archivists' own self-reflection over different purpose perspectives related to the archives' content and organisation is not discussed by Welland, but she points out how it can affect the relationship between expert users such as historians and archivists.

Participatory archiving and participatory archives (Shilton & Srinivasan, 2007; Huvila, 2008, 2024) represent a different approach towards the user or archivist engagement in the archive. The advent of social media technology in the mid-2000s provided an infrastructure for facilitating different types of user participation in archives and other memory institutions, and was founded on ideals of archive management influenced by '*the broader cultural participatory discourse*' (Huvila, 2024, p. 124). The proposal by Daga and colleagues (2022) about a linked data infrastructure for integrating citizen participation in cultural heritage archives is such an initiative.

Shilton and Srinivasan's point of departure is how archives and other memory institutions in their recording and preservation of items '*consciously or unconsciously assert chosen narratives as truth while ignoring or reframing others*' (Shilton & Srinivasan, 2007, p. 88). In particular, they address the challenge of representing the perspectives of marginalised groups, such as, *e.g.*, Native Americans in memory collections curated by non-natives. They argue for participatory archiving as a way to re-envision

> *archival principles of appraisal, arrangement, and description to actively incorporate participation from traditionally marginalized communities [which] will not only allow these communities to preserve empowered narratives, it will allow archivists to move towards the long-debated, and still unrealized, goal of representative collections* (Shilton & Srinivasan, 2007, p. 90).

Huvila documents two projects aiming at establishing digital archives for two Finnish cultural heritage sites with a '*special emphasis on the collaborativeness and conversationality of archive building*' (Huvila, 2008, p. 24). The participatory archives are characterised by '*decentralised curation, radical user orientation, and contextualisation of both records and the entire archival process*' (Huvila, 2008, p. 16). This means, for example, that end users can take part in the curation process and that the archive facilitates additional entry points to the ones restricted by '*traditional record and archive-centred contexts*' (Huvila, 2008, p. 25). A recent study by Huvila (2024) states that although the idea of participation in archives has been central in archive debates of the last fifteen years, there is '*hardly a consensus of what is a participatory archive, or a participatory archival institution*' (Huvila, 2024, p. 122).

The recently suggested relation-based access framework for archival reference (Duff *et al.*, 2024) is based on interviews with archivists on how to improve access to archives for people from oppressed communities. In the study it is discussed how '*the physical layout, finding aids and rules, policies, practices, and procedures send subtle messages that some researchers are welcome, but that others do not belong*' and several components that create barriers for access to archive material are identified. The framework is developed to support users from Indigenous communities in Canada and other oppressed groups, but the authors point out that it also include elements '*that all users might appreciate*' (Duff *et al.*, 2024, p. 109)

The entrance of artificial intelligence may also impact archival expertise and work practice. Cushing and Osti (2022) conducted focus groups interviews with '*working archival and digital preservation practitioners*' (Cushing & Osti, 2022, p. 16) to learn about their thoughts and feeling towards artificial intelligence use in archival practice. A mixture of concern and optimism characterise the focus groups' response to how they foresee the technology in day-to-day practice, and they expressed a lack of trust in the technology, in particular for dealing with sensitive information.

In our study, we look at how users with expert knowledge of archives use the archives, as archive curators, in relation to their own research, and as service providers to other users. The reviewed literature addresses expertise as something that is taught to end-users, mainly academics, but also how additional perspectives, in the form of the expertise held by marginalised groups can be used to improve the representativeness of other perspectives in archive collections. The literature

describes different dimensions of archival expertise; related to knowledge about archive objects' form (artefactual literacy), their purpose (purpose literacy), their organisational principles (archival intelligence), their content (collection knowledge), and their context (domain knowledge). In the following section we address a specific type of domain knowledge that influences the archive workers in our study, post-colonial knowledge.

Domain knowledge: how the post-colonial understanding influences on archive curation

As shown above, domain knowledge is recognised as an important dimension of archival expertise, and is defined by Yakel and Torres as '*an understanding of the topic being researched*' (Yakel & Torres, 2003, p. 52). Our study takes place in a setting where the collections contain objects that stem from colonised nations and/or the collection documents activities in colonised areas seen from the perspective of the colonisers. Thus, domain knowledge on the coloniser-colonised relationships influences the archive workers, both as scholars and in their work organising the archive collections. We therefore provide a short review of works that examine how cultural heritage institutions, including GLAM institutions, take into account traditionally excluded groups such as colonised people, immigrants, and minorities when organising their collections. The archive workers' domain knowledge on the effects of colonialism is of relevance when we explore how this influences them in their curation and other interaction with the collection. It must be pointed out that this is the setting of the current project, not to study their activities from a post-colonial theory point of view.

Post-colonialism emerged in the 1950's as a reaction against perspectives and mindsets that influenced how the colonialists, *i.e.*, people stemming from European colonising cultures, understand the world. This understanding has influenced many disciplines and fields of knowledge, including library and information science and archival science (Caswell, 2011; Khanal, 2012; Olson, 2000).

In the previous section we noted how Shilton and Srinivasan (2007) argued for archives adopting participatory approaches to incorporate marginalised audiences' perspectives. Similarly, Duff and colleagues (2024) argue for a framework that can improve how archives meet oppressed user groups. Also for other GLAM institutions, such as museums, participatory approaches have been used to engage minority communities (Simon, 2016). In the book Simon shares stories from her work at Santa Cruz Museum of Art and History to making the museum relevant for diverse user groups through the use of a "*community-first program design*" where the first step is to identify "*communities of interest and learning about their assets, needs, and interests*" (Simon, 2016, p. 99).

Related to the idea of participatory archiving are the calls for reparative description, redescribing archives, and reparative archives (Hughes-Watkins, 2018; Sutherland & Purcell, 2021). The purpose being to repair the harm done that has been the results of '*violent [archive] practices with decisions to cultivate, preserve, and make accessible homogenous narratives that eliminate evidence of other communities*' (Hughes-Watkins, 2018, p. 6). Hughes-Watkins (2018) describes a reparative archive at Kent State University in the USA, called The Black Campus Movement (BCM) Collection Development Project Initiative, in which previously neglected black student life at the university is documented. Sutherland and Purcell (2021) make recommendations for '*decolonizing extant descriptive practices and embracing redescription as a liberatory archival praxis*' (Sutherland & Purcell, 2021, p. 61). They use two cases to illustrate this. The first case concerns the manuscript collection in the Hawai'i State Archive, which pertains to Queen Lili'uokalani, who is the last reigning monarch of the Kingdom of Hawai'i, which they argue should be described in 'Ōlelo Hawai'i [the Hawaiian language]. The collection is now online, with metadata in both 'Ōlelo Hawai'i and English. The second case problematises how uncritical adoption and reproduction of descriptions of colonised and enslaved people means that further harm is brought to them when archives are digitised.

White (2018) discusses how many library knowledge organisation systems, such as the Dewey Decimal Classification (DDC) system and the Library of Congress Subject Headings are biased towards representing '*Euro-American contexts*' (White, 2018, p. 2). White finds that all members of the DDC Editorial Policy Committee are from '*either the United Kingdom or a country that was once a British colony*' (White, 2018, pp. 4–5). One result of this is that libraries in developing countries and indigenous communities have to modify and adapt knowledge organisation systems '*to fit into cultural and institutional settings that were not originally envisioned as potential use cases*' (White, 2018, p. 3). In a study of three libraries in Bangkok, Thailand, White shows the challenges in using DDC to classify texts on Buddhism or Thai languages. The decolonisation of knowledge organisation systems, by increasing the representation of the traditionally marginalised voices from former colonies in the organisation systems, can be considered a step towards what the Kenyan author Ngũgĩ wa Thiong'o has coined the '*decolonisation of the mind*' (Ngũgĩ wa Thiong'o, 1986).

As can be seen from articles reviewed in the previous section (Shilton & Srinivasan, 2007; Welland, 2022) archives' reflection of colonial powers in their selection and organisation of items and records is a problem that has been recognised by many. Gilliland and McKemmish (2014) discuss how a model of participatory archives can be applied in the promotion of human rights, reconciliation, and recovery. The participatory approach is in opposition to the traditional view of archival description systems and management

> *in which a singular "record creator" operates and is blind to the contexts of others who participated in the activities or events documented in the record, gives agency to a singular record creator at any point in time, and assigns to the singular records creator alone an extensive suite of rights in the record* (Gilliland & McKemmish, 2014, p. 82).

Recent studies have specifically addressed digitisation of archives and it has been argued that the digitisation of colonial archives has the potential for decolonisation (Agostinho, 2019; Jeurgens & Karabinos, 2020), although there are several ethical problems that need to be handled, as stressed by Sutherland and Purcell (2021) in their discussion of the digitised Atlantic slavery archives. Agosthino, discussing the colonial records of the former Danish West Indies, points out that the power structures embedded in the archives '*may condition and hinder the potential of post-custodial thinking, that is, a full contribution by documented communities or their descendants to the making and interpretation of the records*' (Agostinho, 2019, p. 152). Jeurgens and Karabinos (2020) analyse initiatives to see whether digitisation of Dutch colonial archives offers possibilities to decolonise them. At the same time, the authors stress '*that there is something innately colonial in the recordkeeping systems that cannot, and should not, be removed, and, yet, must also be decolonized*' (Jeurgens & Karabinos, 2020, p. 202) since the removal of the colonial structure would '*take away the ability to continue to learn from and about the colonial period*' (Jeurgens & Karabinos, 2020, p. 202).

Our study aims to identify how the archive workers' knowledge about the colonial aspects of the items affects the knowledge organisation and curation of the material, thus the intention of this review has been to emphasise such aspects identified in previous work.

Method

The interviews with the five archive workers were conducted as semi-structured interviews. An interview guideline was developed to elicit the participants' contexts of information searching and search behaviour. The interviews were carried out in March and April 2022 and lasted between twenty-five minutes and one hour. All interviews were conducted in English, online, and were audio-recorded and transcribed by the interviewing author.

Our sample of participants constitutes a purposive sample (Wildemuth, 2009) in that we deliberately recruited persons who work as curators and mediators of cultural heritage archives and who had experience from work on post-colonial research projects using material from cultural heritage archives. One of the participants works at a project partner archive, two are connected to a *sister* project financed under the same research call as ours, whereas two were recruited through personal networks. We acknowledge the sample is small, and therefore do also note that the ambition is not to obtain data and results to generalise from; instead we want to obtain qualitative data and insights of archive use from this rarely studied group of users and hereby contribute a piece of information to the bigger picture of archive use.

In this reporting we have paid particular attention to questions related to the participants' information needs, preferred information sources, their knowledge about the data collections, and their thoughts and experiences on how the post-colonial perspective in the form of their domain knowledge influence their curation of the collections.

We applied thematic analysis (Braun & Clarke, 2006) when analysing the data, which is a method that consists of six phases: (1) familiarising with the data; (2) generating initial codes; (3) searching for themes; (4) reviewing themes; (5) defining and naming themes; and (6) producing the report. As mentioned, the interviewing author transcribed the interviews, and the other two authors undertook the thematic coding and analysis. Hence, the two authors did obtain familiarisation with the data (phase one) through several readings of the transcripts. The coding in phase two was managed differently by the two authors. One author applied an inductive, data-driven, approach; whereas the other author had a theory-driven approach (Braun & Clarke, 2006, p. 88), where the research questions were used to guide the analysis in a deductive way. The two coding authors used a text editor system to manually code the interviews. Searching and reviewing themes (phases three and four) involved analysis of the coded data at the broader level of themes, *i.e.*, sorting the different codes into potential themes, as well as collating all the relevant coded data extracts within the identified themes (Braun & Clarke, 2006, p. 89). In phase five the two coders met up and decided on the naming and definitions of themes. In the current paper we have reported on results related to the following themes: *information needs*, *knowledge about the collection or source knowledge*, *indexing and metadata*, and *language shifts*. The information needs are analysed with respect to topic, domain, and purpose, relying on previous findings of information need characteristics identified by Borlund and Pharo (2019). These three dimensions of the information needs crystalise as a result of the responses to the following questions: what are you going to find information about? (topic); why are you interested in this information? (domain); and what are you going to use the information for? (purpose). Interview data coded *knowledge about the collection or source knowledge* have been used in our analysis of archive workers' expert knowledge. Data coded with *indexing and metadata* or *language shifts* was of particular importance for our analysis of the influence of post-colonial perspectives on curation.

Results

Before we present results from the five interviews, we give a short presentation of the participants, who are labelled P7-P11. More information about the participants P1-P6 can be found in articles reporting on the PICCH project (Borlund *et al*., 2023, 2024).

Participant 7 (P7) has a background in anthropology and works at a research museum on cultural history in Norway as a scholar and curator. P7 manages both their own research information needs, and searches for information on behalf of others.

P8 works at a French project partner archive as curator and scholar. P8 is in charge of an audio-visual archive covering the Mediterranean area and the Islamic world. P8 curates the collection and deals primarily with information needs on behalf of others.

P9 is curator and scholar at a French museum of cultural history, working with information needs on behalf of mainly musicologists and ethnomusicologists. P9 manages the collection, takes care of the sound archive of Muslim interests, and extends, refines, and updates the collection.

P10 has a background in social anthropology working as a curator and scholar at a Norwegian research library and archive. Like P7, P10 manages both their own research information needs and searches for information on behalf of others.

P11 is an ethnomusicologist, working as a scholar and curating a collection of ethnomusicology at an Indonesian university of art. P11 works with information needs on behalf of archive users and with curation of the collection.

The results are presented in accordance with the three stipulated research questions. Hence, we start by reporting what characterises the participants' information needs, followed by how their expert knowledge influences their information searching, and finally how their post-colonial domain knowledge influences their curation of the collections.

The archive workers' information needs

The first research question we investigate relates to the archive workers' information needs. The participants were asked the question '*What have you been working on recently? (Please describe your typical processes for looking for information in the archives.)*' The aim of the question was to identify the type of information they were searching for, and for what purposes they needed it. Since archive workers in the study shared a scholarly interest in post-colonial history, we hoped to learn how this type of domain knowledge shaped their information need.

P7 explains:

> *I have searched for like audio recordings of, of Blackfoot Indians in the national library [...] It's for a digital repatriation project and so there's a musicologist, who has done recordings of Blackfoot singing, [...] and so I've located these recordings and now I am trying to, have copies [...] of the music of the tapes.*

The searching by P7 is for a project the participant was involved in. Similarly, both P10 and P11 talk about searching for information for their own research projects:

> *Uhm, recently I have been working on, uhm, the history of anti-racism in Norway. I've also been looking at colonial history that relates to Norway that during the period Norway was a part of the Twin Kingdom of Denmark-Norway. I specifically have been looking at the Danish West Indian colonies, St. Croix, Saint John and Saint Thomas [...] and their and the period the history surrounding their relationship to Denmark.* (P10)

P11 outlines an information need about pictures:

> *So, on the Jaap Kunst Collection* [named after the Dutch ethnomusicologist], *there are a lot of pictures about [...] islands in Indonesia. The pictures are from a hundred years ago. And, the pictures are like, about the community and then the housing and how they perform. And also they have like a ritual.*

P9 explains about searching for information on behalf of others, *i.e.* in the role as mediator, and provides two examples of this. The first example is about how to serve a scholar who wants to have recordings of how Tunisian musicians played '*before the decolonisation and at the beginning of the decolonisation, because after there is a normalisation of the music style*'. In the second example, a movie director needs content for creating a documentary: '*for a film about squall fishing in Indonesia. [...] he was looking for the song from singing girls about this area. So I give the permission to use the music*'.

P8 provides a third perspective on information needs, by sharing how to conduct information searching for curation purposes. The example concerns how it may be challenging when handling a collection in which many languages are represented:

> *For example in this collection, because we have a French, Arabic, Hausa, Zarma, uh, Tamasheq and I [...] would like to try how to find this vocabulary in the different languages and representing or giving an idea of, uh, all these all the researchers work, all the different kinds of research because I have linguistic anthropologists, sociologists, geographers also. So I would like to try this. It's an idea, [which is] very difficult.*

With respect to the topics of the information needs we see how the archive workers search for a variety of different topics, but also how three of our participants (P9, P10, and P11) search for information from geographic regions (Twin Kingdom of Denmark-Norway, the Danish West Indian colonies, Indonesia, and Tunisia), with the Twin Kingdom of Denmark-Norway being the colonial power and the remaining three having been colonised by European nations. In addition, P7 specified a need to find information on the Native American Blackfoot Tribe, which historically lived on the Great Plains of western North America. Whereas P8's perspective was oriented towards a diversity of languages represented in the collection, many of which are spoken in Africa.

The domains of the information needs are all work related and can be nuanced to cover searching for own research projects (P7, P10, and P11), searching on behalf of others (P9), and searching as part of collection curation (P8).

The results reveal that the purpose of the information needs is closely related to the domains and concerns repatriation, *i.e.*, the returning of cultural heritage material to the communities to which the material belongs (P7), filmmaking, *i.e.*, creating new cultural products (P9), collection curation (P8), and scholarly research (P7, P10, and P11).

In addition, the information needs are characterised by targeting different types of mediums, objects, and artefacts such as, *e.g.*, texts, tape recordings, pictures, and maps, as seen below.

Expert knowledge

The second research question concerns how the archive workers' expert knowledge influences their information searching. In particular, we wanted to study the influence of collection knowledge, archival intelligence, and artefactual literacy. The archive workers touched upon these issues on several occasions in the interviews.

Collection knowledge

The archive workers' collection knowledge is built upon experience from working with the collection, both for curation purposes, to help other users, and for their own research. They know how the different collections are complementary to one another concerning what material has been collected and digitised. The provenance of objects in the collection also forms part of their collection knowledge. As seen in this example from P7:

> *I could take another example [from] a collection that we have, which is an Australian collection, collected by this Norwegian explorer called Carl Lumholtz. And in our database you cannot search like on the collectors. The collectors are not [searchable, but] they're included in the provenance [...] To find out which items that we have [...] I have to go through like every object in the Australian collection, [...] maybe 1000 – 1500 objects. And then I have to open the provenance of every object and look at you know, whichever objects are from him [...], but he also collected things for the Natural History Museum and they of course have like a completely different database that has completely different search words, but they also have [...] made autobiographies of their collectors, but their biographies are not connected with the objects, so you have to do both, because otherwise it doesn't work.*

In the above example we see that the organisation of the collection necessitates that P7 uses manual look-up information searching strategies. The archive worker knows that searching the names of persons that created or collected sub-collections is not possible, since these names are not indexed and hence not searchable, thus each object must be inspected individually. The excerpt also shows that P7 is aware of supplementary collections that can be used; this may require that the searcher negotiates to get access to the collections and the formulation of other information search strategies.

As curators, it is natural, as P7 shows in the excerpt above, to have extensive knowledge of other collections. The collections may be similar with respect to content, but have been developed for other purposes as P8 exemplifies:

> *I am organising so I know about these collections, but I know also that there are other institutions, libraries [...] which have the same kind of collections. I know because it's my job to know them, because there are not a lot of sound archives in the field. I know for example, the INA collections or collection of the television and radio. I know them very well, but [...] uh, how can I say, there are sound archives organised for dissemination in the television. My archives are different, they are research archives.*

When searching the television sound archive, it will be necessary for P8 to combine collection knowledge with archival intelligence (see next section on archival intelligence) to adapt to another type of information system. Collections coined *archives* may differ a lot, depending on their purpose and functions. Cultural heritage archives, which P8 curates, and television archives may contain the same type of content, but whereas the first are traditionally used by scholars for research purposes, the latter are also used by film makers and journalists to create new audiovisual works. This will be reflected in the indexing (description) of the collections and hence the information searching facilities.

The following quote by P10 illustrates the interplay of domain knowledge and collection knowledge:

> *Because I am a researcher myself and because I manage my responsibility as a research librarian is to know what is being researched, what researchers are interested in, to know our collections. Make sure we don't have a lot of holes in our collection and also to know as much as we can about our own collection, so that's [an important part of what] my job is, I feel that it's just part of my job to know which other institutions have relevant collections that can increase the value of our own material and the collections at the National Library.*

Archival intelligence

With respect to archival intelligence, which includes knowledge about archival principles, practices, and procedures, the participants shared their thoughts on indexing procedures, how to organise collections and digitisation. Above, when referring to P8's potential use of television archives, this also exemplifies the need to combine collection knowledge and archival intelligence when planning to search them.

P8 also shares insight into collaborating ('*we work together*') with scholars when archiving, indexing, preserving, and disseminating their source material. Further, P8 discusses the value of knowledge about the archive's controlled vocabulary to retrieve objects, since this may stem from different disciplines, explaining that '*historians don't use the same words as anthropologists*'. We also discussed the diversity of language above, when addressing how P8 tried to formulate information needs for curation purposes and had to deal with the vocabulary of several different languages. Language diversity also plays a role in the next example. P9 explains that their indexing is designed to facilitate cross-language retrieval: '[*w*]*e do that for the technical terminology about sound language in three languages, French, English, and Spanish, to switch between the languages.*

We would [also] like to do that for [the] musical terminologies'. This means that P9 and other users may use French when searching for objects in the archive that are described in other languages.

When talking about how to facilitate access to the archive, P11 emphasises the organisation of the collection to make '*the structures [of] how to read the archive*'. We interpret this as using archival intelligence to organise and contextualise the archive items at a higher level than merely the addition of metadata. In this sense '*read*' must be understood as more than searching the archive.

P10 provides a very interesting example, where both archival intelligence and artefactual literacy play a role. In this case, we see that metadata records are used as research objects. The participant starts by saying that's '*interesting because the metadata descriptions, uh, lagged behind, so depending on when the metadata was created the terminology in the metadata [represent] a whole different set of information. [...] [metadata] is a research subject in itself, right?*' In this case, metadata knowledge exemplifies archival intelligence, whereas P10's interpretation of metadata as an object or artefact for research is based on the participant's artefactual literacy. This is further explicated as follows:

> *yeah, so I use the metadata being an anthropologist. I look at the metadata and I say, huh, that's interesting. That is a fact that this metadata represents this issue in this way, that means that that tells us something about the framework and the categories and the framework for understanding this issue.*

Artefactual literacy

P10's example from above emphasises an interesting combination of artefactual literacy and archival intelligence. For scholars who are experts on knowledge organisation of archival objects, the metadata used to index the objects can be the object of research, *e.g.*, to improve retrievability of the objects, to secure better metadata interoperability, to create better search interfaces and so on. Our interviews also contain other examples of artefactual literacy, *i.e.*, the scholar's or curator's ability to interpret and understand the archive objects' value as evidence.

P10 explains about the interpretation of old maps:

> *that map is a map of the African continent that is drawn in a very specific way, and it's important because it's the first time that the mapmakers were engraving, using engraving as a technique to put colour, and to depict people*

further that the map is

> *a very interesting object because [...] we have two versions of the map and one version has a table with the names of plantation owners written, or pasted glued onto the map so by collaborating with my colleagues who are the specialists on these particular collections I was able to discover which of the objects have been digitised and are available, you know, through the digital library and I was able to gain more information about them and to figure out [...] in which other archives are there similar material.*

In the example we also see the interplay of artefactual literacy (interpreting the map as an object), archival intelligence (digitisation of objects), and collection knowledge (which collections contain relevant and non-relevant material) in supporting the scholarly work. P10 uses this to search information in other systems ('*the digital library*') and to make plans for searching other archives.

A third example of artefactual literacy is provided by P7, who explains how a set of objects in the collection may constitute a whole and thus should not be interpreted as independent objects:

> *so there's one pair of shoes, one jacket when you know, like when coat and hat you know and they're [treated] like singular [objects]. But of course they weren't singular when they were collected, they might belong to one person, or they might have been like a religious outfit. You know that only worked if everything were together. And you know. [...] On the same person,*

so they're not actually individual objects, but so even the fact that we treat them as individual objects is a colonial kind of intervention in the artefacts and [...] so the artefact should be [treated] like the entire thing, not just like a pair of boots.

From an information searching perspective the last example is very interesting, since it raises questions concerning how to search for an entity when it has been separated or *deconstructed* into individual objects. This exemplifies, in archive theoretical terms, a lack of archival integrity (or *respect des fonds*), *i.e.*, to not preserve material individually that should have been preserved as a group. This last example also relates to our third research question: how does the archive workers' post-colonial domain knowledge influence the curation?, which we address in the following section.

Domain knowledge: curation in a post-colonial perspective

The third research question examines how the archive workers' post-colonial domain knowledge influences the curation of the collections. In the example above, P7 emphasises how the organisation of the objects in the collection reflects a lack of understanding of their origin: *'that we treat them as individual objects is a colonial kind of intervention'*. This embedded lack of understanding is not only disrespectful towards the colonised communities, but also has consequences for scholars and others trying to access and use the material. It demonstrates how systems and standards for organising the collections developed from the colonisers' perspective, influences the quality of indexing and thereby access to the collections.

During the interviews, the participants highlighted issues related to shifts in language use. P8 reflects that when documenting the independence war in Algeria under these terms, the term *war* was not favoured by the French: *'they don't like it a lot in France'*, but preferred to use *'un événement'*, *i.e.*, the events in Algeria. It is not clear how this is reflected in the organisation of the archive, *e.g.*, if both the Algerian and French terms are used for indexing.

P10 elaborates on changes in language use in the following excerpt:

> *to follow the movement of [...] people of African descent across several centuries, you have to use different words, because the labels and the terms for describing people, not only because of different languages but because of different history of ideas and the way that the history of race and classification has, has different histories, is an economic history, a social history, a political history that is part of a world history.*

P10, when explaining about the collection documenting the colonial history of Denmark-Norway, talks about how African slaves were not labelled slaves, but *servants* in material from the 17th and 18th centuries: *'you don't know that the servant was really [a slave] once it's described in the Norwegian census as a servant'*. P10 has asked colleagues at the archive *'to change and update the metadata'* to reflect the terms used, but also problematises the challenge in updating *'all the metadata'* of the collection, stating that: *'you can't go into a collection with thousands, hundreds of thousands or millions of objects and update metadata from different periods, but one can, one can try to influence new metadata creation'*.

Colonisation affected millions of people whose lives were irrevocably changed. The archives that document these people's lives to a large extent represent the vocabulary of the colonisers, which is demonstrated in the three latter examples. They all provide cases of how colonisation has affected the terms used to describe events, geographic regions, and people. The participants discuss how the archives may adapt to this, but point out the challenges represented in updating *'all the metadata'*.

Seeking help from domain experts is a strategy used in the curation, which is exemplified by P9, who explains how a Tunisian scholar helps in curating Tunisian musical material: *'to identify the*

content [...because] it's very important to have access to this data because this is the post-colonial recordings [made] during the decolonisation'.

Discussion

In this section we continue working along the line of the three research questions, hence we shape the discussion upon the research questions.

As for research question one, concerning what characterises the archive workers' information needs, it is evident that the information needs can be characterised by their topics, domains, and purposes in line with previous work by Borlund and Pharo (2019). As in the case of Borlund and Pharo, we see how a variety of different topics are searched for, and further how geographic region is of importance in several of the information needs. The latter is also in line with the findings of Allison-Bunnell and colleagues (2011), who found that archive searchers request indexing of geography to ease retrieval. In addition, the nature of the collections is reflected in what is searched for, and hence adds to the characterisation of the information needs with respect to the different types of mediums, objects, and artefacts such as texts, tape recordings, pictures, maps, clothing *etc.* that are being searched for. This further adds to the complexity of cultural heritage information needs.

Regarding domains, that is, the answering of the question '*why are you interested in this information?*', the participants' information needs are characterised by being solely work-related, hence of the *work* domain. This is different from the Borlund and Pharo study (2019) where three different domains were identified: work, studies, and personal interest. That said, the search focus of the Borlund and Pharo study was broader and concerned with Web searching. However, based on the present study, we can further nuance the work domain to searching for own research projects (searching as scholar), intermediary searches on behalf of users (searching as mediator), and searching as part of collection curation (searching as curator). In (Borlund *et al.*, 2023, 2024) we present other data from the PICCH project which includes information needs in both the domains *study* and *general interest*. In other words, information needs in archives are not restricted to the work domain only, but given the fact we are addressing information needs of persons who work in archives, it is not surprising their information needs are work-related.

The purposes of the information needs were to support scholarly work, create cultural heritage (filmmaking) and repatriation, the latter clearly resonating with a post-colonial perspective. As in the case of the Borlund and Pharo study (2019) it is clear how the information needs of the archive workers are best understood in the light of the domain and purpose, because together they explain the context of searching and the motivation for searching. Hence, the information needs elucidate the work roles, which are tightly coupled to their expert knowledge and collection curation, addressed in the additional two research questions.

The roles of the archive workers, as depicted via the information needs, reveal how they function as intermediaries between the users and the collections when searching on behalf of others, how they are scholars when searching for information for their own research projects, and finally how they act as collection curators when searching as part of curation. Their role as intermediaries, where they become the bridge between the users and the collections owing to them being both curators and scholars, is worth commenting upon. They successfully fulfil the bridging by partly handling the users' information needs owing to their professional knowledge about the collections (collection knowledge and archival intelligence), and partly by relying on their domain knowledge (topical expertise).

This again, highlights the importance of the participants in our study's role as intermediaries contributing to the satisfaction of users' information needs, which to a large extent is documented in the research literature on the work of *archivists*. For example, how archivists help users

clarifying their information needs (Goodman, 1993; Tibbo, 1995), or how users make the best use of archival resources via the archivists' mediation of their information needs (Johnson, 2008). Users may even depend on the help from the archivists, or other archive workers, to find relevant material (Duff & Johnson, 2002; Tanaka, 2021).

A final comment about the archive workers' roles is with respect to the information searching for curation. The example provided stems from P8, concerning the diversity of languages. To us this also demonstrates the acknowledgement of potential users and hence can be perceived as a pro-active gesture towards future handling of information needs.

With respect to research question two, concerning how the archive workers' expert knowledge influences their information searching, we have found several examples on how collection knowledge, *i.e.*, the archive workers' knowledge about the items in the collection; archival intelligence, *i.e.*, knowledge about the organisation of archives; and artefactual literacy, *i.e.*, their competency in interpreting items as evidence, influence their information searching. We have also documented how the different types of expertise interplay, *e.g.*, when P10 explains how metadata records can be treated both as tools for retrieving items, as well as serving the role of artefacts themselves, that can be used as objects of research.

We have documented that the participants have extensive knowledge about their own collections, as well as collections managed by other institutions. The collection knowledge is used to support their own searching and in the guidance of other users of the collections.

The participants all had a scholarly background. In varying degrees, they partly worked as scholars and partly as curators and mediators (or archivists) of the collections. Their combined work roles meant that they had extensive domain knowledge, *i.e.*, knowledge about their scholarly field, in addition to the collection specific knowledge. The distinction between collection knowledge and domain knowledge may be unclear, since knowledge about the collection implies domain knowledge. It is therefore important to clarify that collection knowledge is used to denote knowledge about what objects a collection consists of, as well as what objects are not in the collection. Domain knowledge is independent of the collection.

Collection knowledge has previously been acknowledged as being an expertise that users of the collection appreciate highly when they try to find items in archives, *i.e.*, an expertise sought after among reference archivists who play the role as intermediaries between end-users and the archive collection (Duff *et al.*, 2013; Tanaka, 2021). The collections mentioned by the participants interviewed in our study vary with respect to content and means of access. If we had been able to talk to more archive workers of this type, *i.e.*, curators or scholars, the diversity of collection knowledge would certainly have increased. We demonstrate that the collection knowledge is not only essential for guiding end-users, but also influences the participants' planning of their own information searching strategies.

With respect to archival intelligence, the participants in our study emphasised issues related to providing access to the collection, *i.e.*, indexing principles and practices to facilitate information retrieval. Access through digital information systems was facilitated in some of the archives, and to a certain extent digital surrogates of objects in the collection were available. The quality of metadata and use of controlled vocabularies are challenges also faced in other GLAM collections (Mitchell, 2013; Vlachidis *et al.*, 2021). In comparison to library collections, the archives are very heterogenous with respect to content, which makes archival organisation and reference work more challenging (Duff & Fox, 2006), and in how archival collections serve different purposes (Caswell, 2011; Welland, 2022). For these reasons, the techniques used to facilitate retrieval of items in the collections that the participants talk about represent great diversity, *e.g.*, one collection supports cross-language retrieval, whereas another necessitates manual look-up of items. It could

be interesting to compare the archival intelligence with *library intelligence* to learn more about how curators of different types of collections build up and use their expertise.

It is a major challenge to retrieve non-textual items, as is the case of many archival objects. Therefore, it is important to have high quality metadata and consequent indexing practices that represent the objects and their origin and provenance.

It is worth noting that many of the issues related to labelling concerns the collections' metadata vocabularies. The collections need to be described in a way that consider the perspective of the colonised (Shilton & Srinivasan, 2007; Gilliland & McKemmish, 2014). Reparative description (Hughes-Watkins, 2018) is further discussed below.

Archival intelligence is an important competency for securing access to collections, in the form of the indexing, mediating, and curation principles used to organise collections. We have also shown that archival intelligence interplays with collection knowledge and artefactual literacy when archive workers plan their information searching. Since the archive workers play three roles, as scholars, collection curators, and mediators, they possess essential knowledge that helps them in all roles; they combine their expertise in finding objects of research in their role as scholars and mediators and similarly exploit their expertise in interpreting and understanding the items in their role as curators.

The third type of expert knowledge we investigated, artefactual literacy, is concerned with knowledge in interpreting archival objects. We have provided examples of clothing, maps, and metadata in use as objects, *i.e.*, artefacts, of research. Also, in relation to artefactual literacy, the participants' post-colonial perspective is present; P7 problematises how objects are removed from their original context, calling it a colonial intervention. Foremost this lack of archival integrity is problematic with respect to its lack of respect for the objects' origin, but from a scholarly perspective it also represents possible data loss.

With respect to the interpretation of metadata as artefactual objects, *i.e.*, metadata records treated as primary sources, this can be related to what Wang and Lin (2022) called external criticism-related abilities: more specifically, it deals with understanding of the production context of metadata creation, *e.g.*, what terminology was used at the time of indexing.

In research question three we are looking into how the archive workers' post-colonial domain knowledge may influence the collection curation. Our findings show that post-colonial domain knowledge clearly steers the participants' reasoning on curation. This is expected, given our recruitment of participants; all of them work with collections that document cultural heritage from European countries. The material also includes objects stemming from areas colonised by those European countries, and we addressed how this affected their work in the interviews.

Curating objects that result from the occupation and exploitation of other countries, or people, or geographical areas is necessarily problematic and an issue that the participants are very aware of. The participants reflect over several aspects concerning the power structures embedded in the archives (Shilton & Srinivasan, 2007; Gilliland & McKemmish, 2014; White, 2018; Agostinho, 2019; Jeurgens & Karabinos, 2020), being very aware of the archives '*power to represent*' (Shilton & Srinivasan, 2007, p. 88). In our interviews we have, e.g., heard of how an outfit that may have served religious purposes has been deconstructed and separated into individual clothing items in the collection. Doubtless, our participants voice the need to ensure the representation of the colonised communities on their own premises, and our findings thus emphasise the need for reparative description (Hughes-Watkins, 2018). In the findings reported above we see that curation necessitates conscious decisions about the handling of objects, the selection of metadata, and the need to involve experts from the colonised areas. How to handle objects and what systems to use for indexing them are very complex issues. How knowledge organisation systems used by libraries

embed colonial power structures is explicitly discussed by, *e.g.*, Shilton and Srinivasan (2007) and White (2018). Our findings demonstrate that the same challenges face archival metadata and metadata systems. One of our interviewees (P10) coins the fundamental problem of updating metadata in collections that may contain '*millions of records*'. Solutions to such issues are not simple, and may be related to adherence to the principles of '*consistency and interoperability*' (White, 2018, p. 7), at the same time, further harm to oppressed groups must be hindered (Sutherland & Purcell, 2021). The suggested relationship-based reference framework is promising, as it argues for a '*new archival ecosystem (physical infrastructure, access tools, e.g., catalogs, findings aids, indexes, rules policies procedures, and institutional supports)*' (Duff *et al.*, 2024, p. 107) designed to improve the access and use of archives for oppressed user groups.

Our findings indicate that it is fruitful to systematically study the relationship between archive workers and archivists' different roles as curators, mediators, and scholars and their information needs, their archival expert knowledge, and their domain knowledge. We suggest that this serves as a framework in future research. It has the potential to enrich studies of information behaviour and guide the recruitment, management, and utilisation of professionals with different disciplinary backgrounds in archives, as well as promote the training and career planning for archive workers.

Limitations

It is, of course, necessary to point out that the study is limited by the small group of archive workers that we have interviewed and hence, the findings are indicative and inconclusive. The COVID-19 pandemic limited our possibility to travel and thus perform observational studies at the archives. In addition, we were not granted access to transaction logs from the digitised archives that could have complemented our analysis. Finally, we were restrictive in collecting background data about the participants to secure their anonymity, in line with the European General Data Protection Regulation (GDPR). This, on the other hand, limits our ability to learn more about the participants demographic and cultural background and how this affects their work.

Conclusion

In this paper we report the results of interviews with five persons who identify themselves as archivists, who have a scholarly background and an interest in post-colonial research. We have presented findings about the archive workers' information needs, interaction with archival content from both the searcher perspective as well as the curator perspective, and the types of knowledge they rely on while working in the archive. As such, this study presents a rare and unique example of a study of archive workers and their work in archives containing cultural heritage. Thus, this paper contributes novel insights about archive workers' information seeking behaviour, their handling of different types of information needs, user mediation, and collection curation and supports the call for further research about this archive user group. Future research could also look into the background of the users, *e.g.*, their positionality with respect to them being descendants of people who were colonisers or colonised.

The current study forms part of the PICCH project, a larger European interdisciplinary research project that investigates how cultural heritage collections, as data created in a colonial mindset, can be reappropriated and reinterpreted critically to serve as a basis for a future inclusive society. The study reported here aims to explore the following three research questions:

1) what characterises the archive workers' information needs?,
2) how does the archive workers' expert knowledge influence their information searching?, and
3) how does the archive workers' domain knowledge, in the form of post-colonial knowledge, influence the curation?

Based on our five participants, we can state that the archive workers' information needs can be characterised according to topics, domains, and purposes in line with previous research by

Borlund and Pharo (2019). Interestingly, we can further nuance the work domain into the participants' searching for their own research projects, their intermediary searches on behalf of users, and their searching as part of collection curation. The information needs also reveal how the participants serve different roles, shown by how they are scholars when searching for information for their own research projects, how they function as intermediaries between the users and the collections when searching on behalf of others, and how they act as collection curators when searching as part of curation. When searching, the archive workers search for a variety of different topics, reflecting their information needs. However, geographic region is of importance in several of the information needs, which harmonise with previous research findings (*e.g.*, Allison-Bunnell *et al.*, 2011). Given the nature of the collections, seen by how they contain different storage mediums (*e.g.*, books, audio recordings, films) and artefacts like maps, clothing, tools, *etc.*, this also adds to the characteristics of the information needs and what is searched for. In future studies, we suggest investigation into how archive workers support other users' information needs. In the present study, P9's information needs are examples of such cases with the request to search for how Tunisian musicians played before the decolonisation, and the filmmaker asking for a song from singing girls. The research literature (Duff & Johnson, 2002; Johnson, 2008; Tanaka, 2021) documents that seeking help from archivists to support archive information searching is common. Much less is known about how users search archives compared to users searching digital libraries, and how general and special web search engines are used. Thus, more research on how archivists and other archive workers meet information searchers is imperative.

As for research question two, we found many examples of how our participants use their expert knowledge during information searching. Their collection knowledge, archival intelligence and artefactual literacy (Yakel & Torres, 2003; Duff *et al.*, 2013) shape their understanding in how items are organised, where to find them, where not to find them, and how they fit together with items in other collections. We have shown that the interplay of different types of archive expert knowledge, e.g., the interplay of archival intelligence and artefactual literacy, clearly influences their interaction with the collection. Overall, this gives us insight in the complexity of searching information in cultural heritage archives, which again explains the users' needs for help in mediating their information needs and access to the collections. Future research on this interplay will bring us more knowledge into how archive collections could be organised to secure additional access paths and to design training programs for archive users. In addition, it can be supplemented with more systematic approaches towards dialogues with users and user involvement in the form of participatory archiving (Huvila, 2024), to further enrich the description and indexing of collections.

With respect to research question three, that is, the influence of post-colonial domain knowledge on curation, we found that this type of knowledge is essential in many ways. The domain knowledge of the participants in our study is clearly present when they discuss how to select appropriate metadata, what terms to use, and on the need to update old metadata. Their knowledge about objects' colonial past also influences how they handle the objects in line with the objects' origins and when they question how the objects were previously curated. Finally, we have also been informed about how archive workers seek help from other domain experts to make sure curation is done in a responsible way. Our findings resonate and support previous research on knowledge organisation systems used in libraries (White, 2018); we find that the metadata standards originally developed to manage the archive collections are biased towards representing a European context. More research on the indexing practices of archival objects stemming from colonial collections is necessary to find out how to integrate knowledge about the objects' origin and how they have been reinterpreted by colonisation. Participatory archives and archiving (Shilton & Srinivasan, 2007; Huvila, 2008, 2024; Gilliland & McKemmish, 2014) and reparative archives (Hughes-Watkins, 2018;

Sutherland & Purcell, 2021) represent promising approaches towards inclusion of the perspectives of groups representing the colonised.

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References

Agostinho, D. (2019). Archival encounters: rethinking access and care in digital colonial archives. *Archival Science*, 19(2), 141–165. https://doi.org/10.1007/s10502-019-09312-0

Allison-Bunnell, J., Yakel, E. & Hauck, J. (2011). Researchers at work: assessing needs for content and presentation of archival materials. *Journal of Archival Organization*, 9(2), 67–104. https://doi.org/10.1080/15332748.2011.598400

Baines, J. (2023). Establishing special collections literacy for undergraduate students: an investigation into benefits and barriers of access. *Archives and Records*, 44(1), 8–35. https://doi.org/10.1080/23257962.2022.2149481

Borlund, P. & Pharo, N. (2019). A need for information on information needs. *Information Research*, 24(4). http://informationr.net/ir/24-4/colis/colis1908.html

Borlund, P., Pharo, N. & Liu, Y.-H. (2023). Scholars' searching for audio-visual information in archives. VIEW *Journal of European Television History and Culture*, 12(24). https://doi.org/10.18146/view.302

Borlund, P., Pharo, N. & Liu, Y.-H. (2024). Information searching in cultural heritage archives: a user study. *Journal of Documentation*, 80(4), 978–1002. https://doi.org/10.1108/JD-06-2023-0120

Braun, V. & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Caswell, M. (2011). 'Thank you very much, now give them back': cultural property and the fight over the Iraqi Baath Party records. *The American Archivist*, 74(1), 211–240. https://doi.org/10.17723/aarc.74.1.4185u8574mu84041

Cushing, A. L. & Osti, G. (2022). "So how do we balance all of these needs?": how the concept of AI technology impacts digital archival expertise. *Journal of Documentation*, 79(7), 12–29. https://doi.org/10.1108/JD-08-2022-0170

Daga, E., Asprino, L., Damiano, R., Daquino, M., Agudo, B. D., Gangemi, A., Kuflik, T., Lieto, A., Maguire, M., Marras, A. M., Pandiani, D. M., Mulholland, P., Peroni, S., Pescarin, S. & Wecker, A. (2022). Integrating citizen experiences in cultural heritage archives: requirements, state of the art, and challenges. *Journal on Computing and Cultural Heritage*, 15(1), 11:1-11:35. https://doi.org/10.1145/3477599

Daines, J. G. I., Kopp, M. G. & Skeem, D. M. (2022). Bridging the gap: competencies for teaching with primary sources. *Portal: Libraries and the Academy*, 22(4), 855–878. https://doi.org/10.1353/pla.2022.0045

Duff, W. & Fox, A. (2006). 'You're a guide rather than an expert': archival reference from an archivist's point of view. *Journal of the Society of Archivists*, 27(2), 129–153. https://doi.org/10.1080/00379810601075943

Duff, W., Ho, J., Sato, C., Aton, H., Deziak, P. & Regehr, C. (2024). Redefining archival reference: relationship-based Reference1. *The American Archivist*, 87(1), 107–130. https://doi.org/10.17723/2327-9702-87.1.107

Duff, W. M. & Johnson, C. A. (2002). Accidentally found on purpose: information-seeking behavior of historians in archives. *The Library Quarterly*, 72(4), 472–496. https://doi.org/10.1086/lq.72.4.40039793

Duff, W. & Yakel, E. (2017). Archival interaction. In H. MacNeil & T. Eastwood (Eds.), *Currents of archival thinking* (2nd Edition, pp. 193–223). Libraries Unlimited.

Duff, W., Yakel, E. & Tibbo, H. (2013). Archival reference knowledge. *The American Archivist*, 76(1), 68–94. https://doi.org/10.17723/aarc.76.1.x9792xp27140285g

Garcia, P., Lueck, J. & Yakel, E. (2019). The Pedagogical promise of primary sources: research trends, persistent gaps, and new directions. *The Journal of Academic Librarianship*, 45(2), 94–101. https://doi.org/10.1016/j.acalib.2019.01.004

Gilliland, A. J. & McKemmish, S. (2014). The role of participatory archives in furthering human rights, reconciliation and recovery. *Atlanti*, 24, 78–88. https://escholarship.org/uc/item/346521tf

Goodman, S. K. (1993). Information needs for management decision-making. *Records Management Quarterly*, 27(4), 12.

Hauck, J. & Robinson, M. (2018). Of primary importance: applying the new literacy guidelines. *Reference Services Review*, 46(2), 217–241. https://doi.org/10.1108/RSR-03-2018-0025

Hjørland, B. (2008). What is knowledge organization (KO)? *Knowledge Organization*, 35(2–3), 86–101.

Huang, T., Sun, L. & Zhou, Q. (2023). Archival literacy framework for the public: a Delphi and analytical hierarchy process study. *Library & Information Science Research*, 45(2), 101236. https://doi.org/10.1016/j.lisr.2023.101236

Hughes-Watkins, L. (2018). Moving toward a reparative archive: a roadmap for a holistic approach to disrupting homogenous histories in academic repositories and creating inclusive spaces for marginalized voices. *Journal of Contemporary Archival Studies*, 5(1). https://elischolar.library.yale.edu/jcas/vol5/iss1/6

Huvila, I. (2008). Participatory archive: towards decentralised curation, radical user orientation, and broader contextualisation of records management. *Archival Science*, 8(1), 15–36. https://doi.org/10.1007/s10502-008-9071-0

Huvila, I. (2015). Another wood between the worlds? Regimes of worth and the making of meanings in the work of archivists. *The Information Society*, 31(2), 121–138. https://doi.org/10.1080/01972243.2015.998103

Huvila, I. (2024). Regimes of participation: theorising participatory archives from the outset of archivists' views on archival institutions and user participation in Scandinavia. *Information Research an International Electronic Journal*, 29(1), Article 1. https://doi.org/10.47989/ir291539

Ingwersen, P. (1986). Cognitive analysis and the role of the intermediary in information retrieval. In R. Davies (Ed.), *Intelligent Information Systems* (pp. 206–237). Horwood.

Ingwersen, P. (1996). Cognitive perspectives of information retrieval interaction: elements of a cognitive ir theory. *Journal of Documentation*, 52(1), 3–50. https://doi.org/10.1108/eb026960

Ingwersen, P. (2000). Users in context. *Proceedings of the Third European Summer-School on Lectures on Information Retrieval-Revised Lectures*, 157–178. http://dl.acm.org/citation.cfm?id=646171.678749

Ingwersen, P. & Kaae, S. (1980). *User-librarian negotiations and information search procedures in public libraries: analysis of verbal protocols, final research report*. Royal School of Librarianship.

Jeurgens, C. & Karabinos, M. (2020). Paradoxes of curating colonial memory. *Archival Science*, 20(3), 199–220. https://doi.org/10.1007/s10502-020-09334-z

Johnson, A. (2008). Users, use and context: supporting interaction between users and digital archives. In L. Craven (Ed.), *What are archives?: cultural and theoretical perspectives: a reader* (pp. 145–166). Ashgate.

Khanal, N. (2012). *The lens of postcolonial theory in LIS research and practice* [Ph.D., University of Illinois at Urbana-Champaign]. https://www.proquest.com/docview/1562193712/abstract/E0A18E87C9FD4E17PQ/1

Kirkegaard, B. & Borlund, P. (2008). Characteristics of information needs for television broadcasts of scholars and students in media studies. *Proceedings of the Second International Symposium on Information Interaction in Context*, 116–122. https://doi.org/10.1145/1414694.1414720

Kirkegaard Lunn, B. (2009). User needs in television archive access: acquiring knowledge necessary for system design. *Journal of Digital Information*, 10(6). https://jodi-ojs-tdl.tdl.org/jodi/index.php/jodi/article/view/685

Langa, L. A., Weber, C. S. & Connaway, L. S. (2023). *Pop-up survey: findings from the Building a National Archival Finding Aid Network Project*. OCLC. https://escholarship.org/uc/item/5qp9z6tb

Mitchell, E. T. (2013). Metadata Developments in Libraries and Other Cultural Heritage Institutions. *Library Technology Reports*, 49(5), 5–10.

Ngũgĩ wa Thiong'o. (1986). *Decolonising the mind: the politics of language in African literature*. James Currey.

Olson, H. A. (2000). Difference, culture and change: the untapped potential of LCSH. *Cataloging & Classification Quarterly*, 29(1–2), 53–71. https://doi.org/10.1300/J104v29n01_04

Rhee, H. L. (2015). Reflections on archival user studies. *Reference & User Services Quarterly*, 54(4), 29–42. https://doi.org/10.5860/rusq.54n4.29

Shilton, K. & Srinivasan, R. (2007). Participatory appraisal and arrangement for multicultural archival collections. *Archivaria*, 87–101. https://archivaria.ca/index.php/archivaria/article/view/13129

Simon, N. (2016). *The art of relevance*. Museum 2.0.

Sutherland, T. & Purcell, A. (2021). A weapon and a tool: decolonizing description and embracing redescription as liberatory archival praxis. *The International Journal of Information, Diversity, & Inclusion*, 5(1), 60–78. https://doi.org/10.33137/ijidi.v5i1.34669

Tanaka, K. (2021). Teaching with primary sources: looking at the support needs of instructors. Research Report. In *ITHAKA S+R*. ITHAKA S+R. https://doi.org/10.18665/sr.314912

Taylor, R. S. (1962). The process of asking questions. *American Documentation*, 13(4), 391–396. https://doi.org/10.1002/asi.5090130405

Taylor, R. S. (1968). Question-negotiation and information seeking in libraries. *College & Research Libraries*, 29(3), 178–194. https://doi.org/10.5860/crl.76.3.251

Tibbo, H. R. (1995). Interviewing techniques for remote reference: electronic versus traditional environments. *The American Archivist*, 58(3), 294–310. https://doi.org/10.17723/aarc.58.3.61625250t016287r

Vilar, P. & Šauperl, A. (2017). Archivists about students as archives users. *Information Research*, 22(1). https://informationr.net/ir/22-1/colis/colis1617.html

Vlachidis, A., Antoniou, A., Bikakis, A. & Terras, M. (2021). Semantic metadata enrichment and data augmentation of small museum collections following the FAIR principles. In K. Golub & Y.-H. Liu (Eds.), *Information and Knowledge Organisation in Digital Humanities* (pp. 106–129). Routledge. https://doi.org/10.4324/9781003131816-11

Wang, Y.-Y. & Lin, C. (2022). Artefactual literacy-related abilities for historians' effective seeking and use of primary resources. *Information Research*, 27(Special issue). https://doi.org/10.47989/irisic2211

Weber, C. S., Carbajal, I. A., Langa, L. A., Connaway, L. S., Doyle, B., Brannon, B. & Proffitt, M. (2023). *User interviews: findings from the Building a National Archival Finding Aid Network Project*. OCLC. https://doi.org/10.25333/xq53-yv76

Welland, S. (2022). Created, intended, articulated and projected: four perceptions of purpose around the archival document for expert users. *Archives & Manuscripts*, 50(2), Article 2. https://doi.org/10.37683/asa.v50.10919

Wersig, G. (1971). *Information, Kommunikation, Dokumentation: ein Beitrag zur Orientierung der Informations- und Dokumentationswissenschaft*. Verl. Dokumentation.

White, H. (2018). Decolonizing the way libraries organize. *IFLA Proceedings*. https://library.ifla.org/id/eprint/2221/

Wilkinson, M. D., Dumontier, M., Aalbersberg, Ij. J., Appleton, G., Axton, M., Baak, A., Blomberg, N., Boiten, J.-W., Santos, L. B. da S., Bourne, P. E., Bouwman, J., Brookes, A. J., Clark, T., Crosas, M., Dillo, I., Dumon, O., Edmunds, S., Evelo, C. T., Finkers, R., … Mons, B. (2016, March 15). *The FAIR guiding principles for scientific data management and stewardship* [Comments and Opinion]. Scientific Data. https://doi.org/10.1038/sdata.2016.18

Wilson, T. D. (1999). Models in information behaviour research. *Journal of Documentation*, 55(3), 249–270. https://doi.org/10.1108/EUM0000000007145

Yakel, E. & Torres, D. (2003). AI: archival intelligence and user expertise. *The American Archivist*, 66(1), 51–78. https://doi.org/10.17723/aarc.66.1.q022h85pn51n5800

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