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Promises of mass digitisation and the colonial realities of natural history collections

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Abstract

Recent debates have highlighted the colonial roots and legacies of museums, prompting intense discussions about these institutions within the museums themselves. Amidst the debates, policy-makers and museum professionals worldwide have come to regard the digitisation of collections as an important means for addressing global inequity by advancing fast and fair access to collection items. In this paper we want to caution against the hope that political problems can be solved by technical solutions alone. We argue that the digitisation of collections, like any other technology, integrates assumptions and preferences - about people, capacities, values - that, if left unchecked, reproduce or reinforce inequities. We present different approaches and initiatives developed at the Museum für Naturkunde Berlin (Natural History Museum Berlin, MfN) assessing critical questions about the assumptions and preferences congealed in digitisation efforts. What rationales and imaginaries structure digitisation? Who is served by normative concepts such as transparency, access, participation and standardisation? We argue that digitisation efforts, rather than offering a solution, provide an opportunity to consider the unequal distribution of power, historical responsibilities and epistemic injustices. This paper concludes with tentative recommendations for the digitisation of natural history collections from colonial contexts.

Keywords: colonialism, natural history objects, digitisation, public, access, racism, epistemologies, coloniality, cooperation, Museum für Naturkunde Berlin

Natural history collections and the politics of digitisation

Natural history museums consider themselves keepers of unique collections in "global custodianship" (ICOM, 2013, Sect. 4E) - accessible, usable and preserved for interested audiences and users worldwide. However, past and present analyses of museums' contents, narratives, visitors and staff structures show that they are far from being inclusive (Das and Lowe, 2018). Recent debates in civil society, media and academia have highlighted the colonial roots and legacies of museums, prompting intense discussions about these institutions also within the museums

themselves (see Volumes 9, 2021, and 10, 2022 of this journal). Research on the colonial histories of collections shows that entanglement with imperial politics deeply shaped the rapid growth of natural history collections as well as logistical infrastructures and scientific practices in the field (Cornish, 2013; Callaway, 2022). These developments are part of a much broader societal and political reckoning with the enduring presence of colonial structures in modern society. The term "coloniality of power", developed by the Peruvian scholar Anibal Quijano (2007), refers to the ongoingness of epistemic, economic and political forms of extraction, violence and racism, long after imperial powers have relinquished colonial rule (Mignolo, 2007; Stoler, 2016). Much work is yet to be done to understand how "coloniality" informs natural history collections, practices of collecting, knowledge-making and collection digitisation. The fact remains that the majority of what is referred to as "cultural heritage", including natural history collections, is stored in and controlled by institutions located in imperial metropoles inaccessible to the majority of people (Duthie, 2011; Chambers *et al.*, 2016; Brusius and Singh, 2017; Gordon-Walker, 2019). In this context, many policy-makers and museum professionals regard the digitisation of collections as addressing this imbalance by advancing fast and fair access to collection items. Here, digitisation refers to making available collections or collection information in any digital form. In this sense, digitisation is seen to increase participation and advance access and scientific progress (Hahn, *et al.*, 2021; Popov, *et al.*, 2021). Thus, the discourses and practices of digitisation are tied to grand epistemic and political hopes and promises. This includes practices of digital repatriation and virtual restitution, that is, the return of digitised artefacts (Crawford and Jackson, 2020; Boast and Enote, 2013).

In Germany, technology-driven optimism has gained traction through the federal "3-road strategy". On a governmental level the cultural sector in Germany has agreed on a strategy for the digital publication of collections from colonial contexts held in Germany in a central data repository (Access-Transparency-Cooperation, 2020). This strategy is based on the "Framework Principles for Dealing with Collections from Colonial Contexts" which state that more transparency and documentation is needed regarding objects from colonial contexts as first steps toward addressing "the historical responsibility resulting from German colonialism and the responsibility deriving from actions marked by colonial attitudes" (Framework Principles, 2019, p.1). The framework principles further demand museums increase provenance research on collections from colonial contexts and cooperations with countries of origin. Both framework principles and digitisation strategy were built on the "Guidelines on dealing with collections from colonial contexts" published by the German Museum Association (Guidelines, 2018; 2021). All these directives were the result of decades of appeals, claims and tireless efforts by researchers, activists and civil society groups on a global scale.

These official recommendations suggest that museums are to fulfil their historical responsibility related to colonialism primarily by gathering information on objects evidencing their colonial provenance and making this digitally available. It thus appears that digitisation of these holdings has not only become a governmental and national priority but has turned into a practical means for enacting ethical and political responsibility. In relation to large natural history collections, which commonly function as research museums, the moral imperative to digitise is further compounded by research on the climate crisis and biodiversity loss which requires ever more readily available information. Indeed, for the Museum für Naturkunde Berlin (Natural History Museum Berlin, MfN) this scientific urgency is one of the main drivers for collection development and digitisation.

While digitisation efforts in museums can expand access to collections, we want to caution against the hope that political problems can be solved by technical solutions. We argue that the digitisation of collections, like any other technology, integrates assumptions and preferences - about social groups, capacities, access, values - that, if left unchecked, shore up implicit biases and reproduce rather than redress historical injustices. In the following sections, we present different approaches and initiatives developed at the MfN and use them for asking critical questions about the assumptions and preferences congealed in digitisation efforts. Indeed, we argue that digitisation efforts provide an opportunity to engage with questions about historical responsibilities. Whose rationales and imaginaries govern digitisation? Who is served by normative concepts such as transparency, access, participation and standardisation? What types of access are pursued and for whom? What are the limits of participation in the digital and who are the beneficiaries of digitisation? We believe these questions can begin to account for the emerging social and political consequences of rapidly progressing collection digitisation.

The MfN provides an instructive case study for examining and reflecting on the digitisation of

colonial objects in natural history collections. It holds a large collection containing specimens from all regions of the world that, for centuries, has formed a foundational source for scientific knowledge production. For decades, the MfN's specimen digitisation mainly served the exchange of information for fields such as taxonomy, morphology, biodiversity science, mineralogy and collection management. As a research museum, the focus has been, and remains, on making biodiversity information available to the scientific community. At the same time, the museum aims to establish an "open knowledge infrastructure" that will serve a variety of research questions relevant to society, educational purposes and other applications; sharing information about holdings from colonial contexts is one prominent priority (MfN, 2022a).

Like other national museums, the MfN ordered and facilitated extensive extractions from colonised territories. Colonial networks of officials, military and missionaries appropriated zoological, botanical and mineralogical materials as well as ethnological artefacts (Cisneros, *et al.*, 2022; Künkler, 2022). Museums accumulated and circulated materials and information about the colonies and profited from the asymmetrical, racialised structures of power and labour (Delbourgo, 2011; Heumann, *et al.*, 2018; Hicks, 2020; Hearth and Robbins, 2022). Expeditions led or endorsed by the MfN and other museums also pillaged burial sites and amassed human remains (Hicks, 2020; Künkler, 2022). Collecting institutions engaged in the (re-)production of colonial narratives - about white supremacy, "discoveries", racial typologies - in exhibitions and publications (Dijk and Legêne, 2011; Gelsthorpe, 2020). Natural history specimens formed the material basis for advancing colonial power and knowledge production, including scientific racism and eugenics (Kasibe, 2020; Nyhart, 2009, p.241 f.). Museums, as "knowledge-producing institutions", were the "administrative core of the empire" supplying information and expertise for controlling people and lands, the effects of which set in motion standards, practices and narratives that continue to this day (Richards, 1993).

The MfN collection includes mainly zoological and paleontological objects, minerals and rocks, animal sounds and associated archival material, like diaries, photographs, sketches, literature and notes (MfN, 2022b; c; d). It also holds human remains (MfN, 2022e; Decolonize Berlin, 2022). In 2018, the Federal and State Governments awarded the museum an extraordinary amount of funding for re-constructions and building developments,

including the digitisation of its collection (MfN, 2022f). The combination of funding and MfN's history creates a unique institutional moment that allows us to observe and reflect on the digitisation process as it has been unfolding and explore the potential of interdisciplinary perspectives. During the past 10 years the MfN has developed into an integrated research museum, bringing together experts from natural sciences, information sciences, and uniquely, social sciences and the humanities. As co-authors of this paper who all work or worked at the MfN, our aim is to encourage debate and challenge our past and present scientific and institutional practices. Together, we wish to work towards an understanding of "historical responsibility" in relation to colonialism, which takes into consideration the specific history of the German Empire and its institutions, including museums, as well as the particular role of natural history.

In what follows, we open up a number of problem spaces which have emerged in the course of collection digitisation. We first use the museum's mass digitisation effort to address the tension between speed and specificity. We then move on to attending to the role of standards in the museum's "digitisation on demand" programme and the issue of specificity through discussing the term "colonial contexts". Subsequently, we draw our attention to the rhetorical mobilisation of what is termed as "communities of origin", often used to denote the beneficiaries as well as stakeholders of digitisation particularly in regard to colonial contexts. Arguing against the social imaginary that "communities of origin" implies, we propose to expand our political terminology to diverse publics as self-organised actors that can play a constructive and constitutive role in shaping digitisation processes that foster diversity, controversy and inclusion. We conclude this paper by illustrating possible futures for digital natural history collections.

The logic of digitisation
The digitisation of large numbers of objects at the MfN is already underway (MfN, 2022a; f). It aims to create an openly available digital collection catalogue containing: a) an agreed upon set of essential information that corresponds to requirements from national or international consortia; and b) partially standardised images that document the information available on the labels and objects. To increase the public visibility of this effort, an exhibition opened at the MfN in October 2021, titled "Digitize!" (MfN, 2022g). In addition to the presentation of countless insect drawers, the exhibition hall consists of an array of machines,

assembly lines and computers. This "digitisation street" has been designed together with science and industry partners in order to capture digital images of 500,000 insects and their labels. The spectacle underscores a logic of digitisation driven by volume, efficiency and speed (Blagoderov, *et al.*, 2012; Heerlien, *et al.*, 2013). What are, we might ask, the costs of this logic? In other words, what gets lost when speed and efficiency rule?

These questions point to the "political stakes of mass digitization" (Thylstrup, 2020), which we are only beginning to fathom in the context of natural history collections. Concerning objects from colonial contexts, these stakes need to be considered in relation to a longer history of violent accumulation and its systematic erasure from institutional records. This history is not excised once these objects are reorganised in digital collections and global data infrastructures. On the contrary, ignoring the colonial origins of objects and bracketing off the enduring legacies of colonial violence and racism will ensure their perpetuation (Ashby and Machin, 2022). We face multiple challenges when attempting to account for these contexts. In most cases provenance of objects, i.e. the reconstruction and critical examination of their appropriation, translocation and presentation, has not been researched, remains partial or is unclear. Compounding the lack of knowledge is the fact that there is no default set of information (yet) that can identify and account for "colonial contexts" in the museum database and data portal. A pilot project at the MfN involving historians of science has tagged a selection of objects from the database using the categories "secured colonial context", "probably colonial context" and "not verified" (MfN, 2022h). In addition, a decision tree that is currently in a trial phase will guide collection management staff to input object data to ascertain potential colonial provenance of the object. Also, developments are underway to expand the possibilities for keyword searches in the museum's data portal. A content warning refers to culturally sensitive specimens as well as historical records. It promotes dialogue to discuss these holdings and correct or enrich metadata (MfN, 2022i). Furthermore, there is a focus on the type of language used, exploring substituting, for example, seemingly neutral terms in favour of words that more accurately reflect and specify the circumstances of appropriation (e.g. "loot", "stolen" instead of the ubiquitous term "gift").

While the intricacies of provenance research run up against the primacy of speed and efficiency, the volume and scaling of objects and data compels a flattening of diversity. Mass digitisation favours

uniform collection types, such as insect drawers and herbarium sheets, but it also furthers a narrow, i.e. efficient, understanding of essential and relevant object data.

As such, digitisation of collections for biodiversity science may give rise to a new phase of what some call "information imperialism" that once again unilaterally extracts value and concentrates it in the dominant institutions in Europe and North America. More than 20 years ago, the science studies scholar Geoffrey Bowker warned that the database itself will ultimately shape the world in its image: "if we are only saving what we are counting, and if our counts are biassed in many different ways, then we are creating a new world in which those counts become more and more normalized" (Bowker 2001, p.675). The same is true for digitisation: By selecting what can and cannot be digitised and recorded, we actively shape our notions of nature and history and make them appear natural.

The digitisation of natural history specimens can therefore never be a neutral process: it always entails value-laden choices and selections, such as preferring speed and volume over considering how the historical context of objects might demand different, more responsible forms of processing. In the next section, we detail the domain of standards as one area of responsible processing.

Standards and their discontents

Digitisation is not a universal, standardised procedure despite its dependence on many types of technical and scientific standards. In fact, it is difficult to say what "digitisation" actually means and entails, aside from transforming physical objects into digital information. Besides producing a digital catalogue with basic information as described before, the MfN is also developing a user-driven approach to complement mass digitisation. The diagram "Digitization for everyone" below (Figure 1) offers a simplified overview of this digitisation on demand (Berger, *et al.*, 2021; MfN 2022f). We introduce this illustration as a point of departure to reflect workflows and assess the making and use of standards.

The procedure starts with a request for digitisation (1), by either internal or external users. Initially, the object inventories and databases are checked to see if required data are already available in digital form (2). In case the object or collection is not yet available in one existing internal collection database, the digitisation process starts by integrating any information describing the object
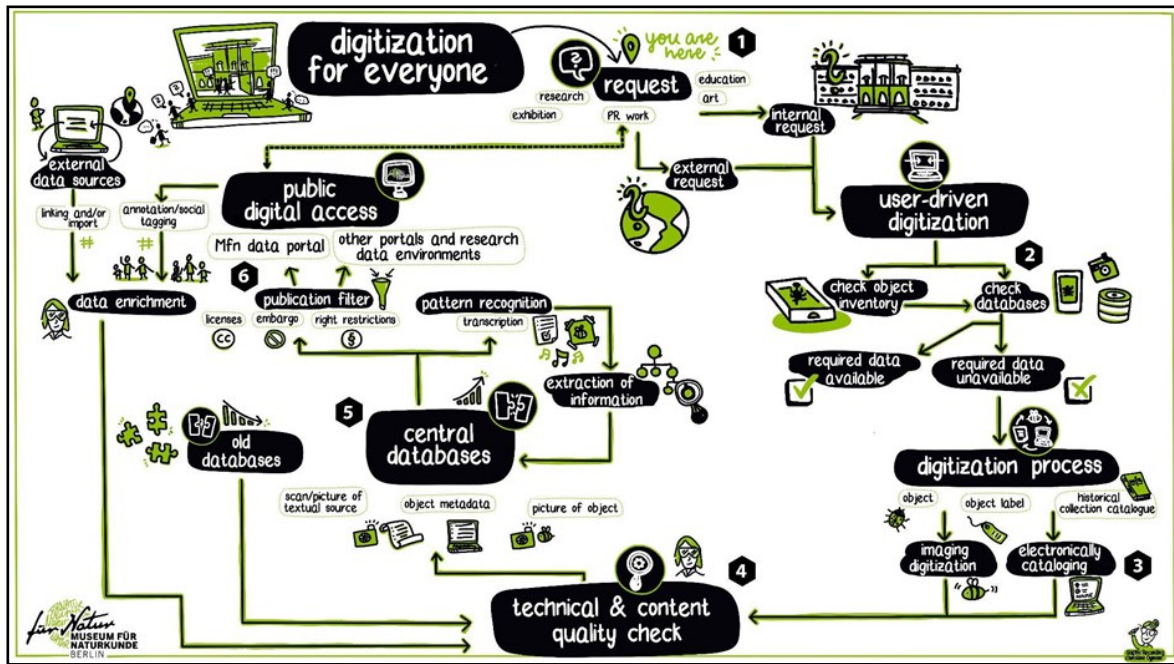
Figure 1. Digitization for everyone. Illustration of the digitisation workflow at the Museum für Naturkunde Berlin (modified after Berger et al. 2021, https://doi.org/10.7479/8h2v-4040).

from historical, paper-based collection catalogues into a central database system (3). At the MfN, the collection database includes a stable identifier and an object title (e.g. the scientific name), other data, like collecting site, year and collector are usually also captured. In addition, digital images are taken of the object labels and, if requested, of the collection object itself (2- or partly 3-dimensional). Throughout the process, quality checks concerning technical aspects take place (4), guided by standards for image and metadata quality. In a next step, object-related information is integrated in the MfN's central database (5), where images, metadata and scans of labels or archival sources are stored and linked. Before being made publicly available in the MfN data portal (https://portal.museumfuernat urkunde.berlin/), the information passes through a publication filter (6). This step is designed to identify internally relevant data (e.g. shelf numbers), localities of endangered species or embargos (for results from ongoing research projects) as well as legal frameworks like general data protection regulations.

In addition to functioning as an internal orientation, this diagram reveals to users what digitisation entails while also suggesting a model for digitisation to other collection holding institutions. Its simplicity belies the complexity of digitisation, which mobilises actors and materials across and beyond the institution, thus requiring coordination work between institutional, technical, social and epistemic layers. This work depends on people making

decisions throughout each of the digitisation steps listed above: decisions about the location of relevant data, the sufficiency of information, the appropriate depth of detail and the time spent on considering and researching connections to colonial contexts. Such decisions are often guided and abridged by the application of standards. The basis of the quality checks (4) are standards for format, data and metadata, as well as controlled vocabularies and processes (e.g. photographing specimens against white or black backgrounds). Standards are ubiquitous and powerful, they make digital objects cohere and mobile across different contexts, and they determine the users and uses of these objects. Indeed, many of the promises articulated in relation to digitization - from widening access to advancing knowledge discovery - depend on standardisation and interoperability, the ability for digitised objects and data to be searchable, discoverable, legible, sensible, exchangeable, citable and workable across different interfaces and domains (e.g. FAIR data principles: Findable, Accessible, Interoperable and Re-usable, 2016).

Yet standards, much like the objects and processes they govern, arise out of particular historical conditions. They are, as Bowker and Star argue, "artifacts embodying moral and aesthetic choices that in turn craft people's identities, aspirations, and dignity" (2002, p.4). In other words, standards represent value-judgements and they configure our world in certain ways. This is why efforts dedicated

to redressing inequalities and biases in data and object collections have begun focussing on making new standards. The "CARE Principles for Indigenous Data Governance" (Collective Benefit, Authority to Control, Responsibility, and Ethics, https://www.gida-global.org/care), published in 2020, were developed by the International Indigenous Data Sovereignty Interest Group (within the Research Data Alliance) with the goal of ensuring equitable and just data practices and products that support the rights, interests and participation of Indigenous Peoples. The CARE principles guide the creation, use and reuse of Indigenous People's data, which includes data not only about Indigenous persons and collectives but also "about the environment, lands, skies, resources, and non-humans" (Carroll, S.; Garba, I.; Figueroa-Rodríguez, O.L.; *et al.*, 2020: 3). Current discussions on developing standards by which the provenance of Indigenous Peoples' data should be described and recorded bring together Indigenous Peoples, stakeholders from the Convention on Biological Diversity, the Nagoya Protocol and scientific publishers, among others. CARE principles are therefore relevant also for the digitisation of natural history collections given that specimens were removed from past and present Indigenous territories. Even if natural history materials may at first appear less problematic than cultural artefacts in ethnological collections, they and their data might have been appropriated in the very same circumstances such as wars or military campaigns. Furthermore, natural history collections are more than mere scientific objects or natural resources. Plants, animals, minerals or fossils were and still are integrated into cultural, economic and political contexts. Songs of the local population at Tendaguru (Tanzania), which originated during the excavation of dinosaur bones in the then colony of German East Africa, lament the loss of the culturally and economically valuable fossils, which were used as fertiliser or for medicinal purposes (Sadock, *et al.*, 2021). Therefore, natural history collections have good reasons for revisiting and reconsidering workflows and routines for identifying objects that require more sensitive handling and dialogue across institutions and diverse actors. More importantly, as natural history collections are central data infrastructures for biodiversity sciences and knowledge production, the development of novel standards needs to include questions concerning epistemic authority, i.e. the interpretation and definition of objects and concepts.

We suggest that digitisation of natural history specimens requires standards that are accountable to communities and publics which maintain historical and current (and future) relations with the objects

and their former environment. Decision making should be rooted in collaboration that defines what collective benefit, control, responsibility and ethics might mean in relation to colonial natural history objects (Local Contexts, 2022; Enrich, 2022). In this respect, we argue for opening up the very process of developing standards, to design it as a cooperative process and to enable institutional and public learning (and unlearning) processes. Diverse project teams would combine different experiences, perspectives and claims in regard to the meanings and uses of collections. Here, as in other forms, digitisation can be thought of as multi-faceted, depending on the object, institution and imagination of the users. It is not an independent operation but deeply embedded in complex, ever changing institutional, organisational and socio-political dynamics and expectations (Hardisty, *et al.*, 2020).

"Colonial contexts": The specificities of historical encounters

Institution's identities were, and still are, defined by the modern paradigm that sees nature as utterly separate from culture (Latour, 1993). Subsequently, natural history collections continue to be regarded as unaffected by political, economic and cultural developments (Buchan, Forsyth and Gebreyohanes, 2021). This institutional paradigm is mirrored in the political and critical public debates on colonial collections where natural history objects play only a marginal role. However, natural history specimens are political and relational objects, connecting historical and current actors, techniques, and interests. They are the product of complex, often violent colonial formations (Ashby and Machin, 2022). As such they were shaped by social worlds and, in turn, have shaped these worlds including scientific networks and institutions, classificatory systems, collection economies, labour markets. One example from MfN being the aforementioned dinosaur bones from Tendaguru.

In Germany, policy documents and public discourse use the term "colonial contexts" to signal the socio-political colonial entanglements of museum collections (DMB, 2021, p.23). Discussions focus on "objects from colonial contexts", guidelines and recommendations are designed to ascertain "colonial contexts" (Framework Principles, 2019). The latter includes, for example, information on the geography and periods of formal colonial rule while also suggesting that museums look beyond such formal rule at asymmetrical power relations more generally.

The use of "colonial context" to label objects places emphasis on colonialism as a constitutive

moment that extends beyond formal colonial rule. Yet, every "colonial context" is specific - in time and place - and characterised by specific constellations of actors, environments and socio-political conditions. Colonial rule was neither consistent, nor uniform. In fact, current research is dedicated to reconstructing and analysing colonial formations in particular settings and territories, such as medical experiments in German East Africa, the persecution of homosexuality in British India, and monetary policies in the French colonies in sub-Saharan Africa. In relation to natural history, scholarship is only beginning to understand the connection between, looting cultural goods in the course of genocidal campaigns in the German colony Southwest Africa/Namibia and animal trophy hunting by colonial officers in their spare time (Conrad, 2011). The specificities matter because different forms of colonial power have different political and ethical implications requiring appropriate responses in the form of, for example, restitutions, reparations, or other types of acknowledgement and redress. Differentiating and specifying colonial contexts also generates a knowledge resource for examining issues such as biodiversity loss and environmental destruction since their emergence and consequences are often tightly linked with imperial histories of exploitation.

What might this mean in relation to the digitisation of collection objects from "colonial contexts"? We suggest that processes of digitisation, such as the one described in more detail above (Fig. 1), involve the collation of information which can inform an assessment of the relations between colonial policies and postcolonial governance structures, including frameworks such as the Nagoya Protocol or the Global Biodiversity Framework. Such information - whether in collections or databases - is often messy: incomplete, unstructured or ambiguous. The instinctive response might be to clean this data, to trim seemingly irrelevant information or update historical terms, such as place names, for the sake of 'getting digitisation done'. While we do not want to dismiss the institutional pressures caused by funding guidelines, we suggest that the digitisation of collections should also be regarded as an ongoing enquiry into the history and future of collections. In this sense, it would be prudent to preserve the complexity of information.

Taking this into account, workflows need to accommodate pauses and interruptions for consultation and reflection. This would also necessitate the involvement of scholars from a wide range of disciplines engaging with colonial pasts and postcolonial presents (environmental

history, global history, social and cultural anthropology, literary studies, political science) in digitisation processes. Concurrently, approaching digitisation as research entails consultation with and participation of publics that have stakes in and claims to the objects, their data and (historical) contexts of appropriation. And lastly, such re-framing would strengthen the recognition and status of personnel tasked with digitising.

Digitisation, as a form of enquiry, can highlight the kinds of connections made and, importantly, unmade between collections and colonialism. It demands specificity, also in how we digitise by, for example, developing different protocols (in relation to metadata, terminology, publishing etc.) for objects looted during so-called punitive expeditions or in the aftermaths of genocidal campaigns. In short, the digitisation process is not a mere transferring of analog to digital formats but could itself be seen as a form or method of research that can potentially recover the specificities of colonial encounters and thus contributes to a better understanding of the differential nature of colonial rule and its consequences. For the wider policy domain, which has—at least in Germany—settled on an unspecified evocation of "colonial context", such differentiated knowledge can inform responsible and appropriate political and ethical responses.

Digitisation for everyone? The question of inclusivity

The digitisation on demand outlined above is titled "digitization for everyone" (Figure 1). The evocation of "everyone" denotes the promise to be fully participatory: everyone should have access to the process and its products. Indeed, much of the literature on the digitisation of collections claims that it furthers "democratisation". This is a familiar promise in the context of technology development which should warrant critical scrutiny as should any easy conflation of technological innovation with social and political progress (Knöchelmann, 2021; Dutta, *et al.*, 2021). Therefore, we take a closer look at who is actually addressed in the digitisation of holdings from colonial contexts and discuss the potentials and possibilities of inclusivity in this process.

In European museums, a paradigm shift regarding the notion of accessibility and dialogue has recently taken place. For many decades, demands for restitution were met with a concerted, neocolonial and racist defence on the part of the overwhelming majority of decision-makers (Savoy, 2022). Due to activist, academic and political

pressure this attitude appears to be changing, at least rhetorically: Public statements and policies now refer to cooperation, dialogue "on equal terms", transparency and, above all, relations with "communities". We encounter references to "source communities", "communities of origin" or "communities of interest" in both scientific and political debates concerning museum collections (DMB, 2021). These "communities" are also the main address of the CCC-Portal, the central digital repository for collections from colonial contexts in German public institutions (Collections from Colonial Contexts, 2021). Here, "community" is used from within institutions to designate external groups with historical, geographical, political or cultural affiliations to collection objects.

The ubiquity and ease by which "community" is evoked makes us pause and consider the work it does in institutional contexts, particularly when called up (or upon) by the institutions themselves. "Community" is a vague term but it suggests a communality, that is, shared values or visions. Community, as Raymond Williams noted, is "warmly persuasive" in "that unlike all other terms of social organisation (*state, nation, society,* etc.) it seems never to be used unfavourably, and never to be given any positive opposing or distinguishing term" (1983, p.40). The work it does is two-fold: on the side of the designated "source community" it projects a level of homogeneity that might not or that might no longer accurately reflect the present social organisation and political representation. This might complicate practices of restitution and reparation which are designed around national governments whose territorial boundaries might fall short of fully encompassing so-called source communities (who might also live in adjacent countries or in the diaspora). On the side of the institution, the mobilisation of "source community" enacts a division between "us" and "them". In this sense, the designation of community can shore up ideas of the racialised Other (Spivak, 1985; Minh-Ha, 1989), since "race often appears under the euphemism of community" (Ahmed, 2012, p.35). Therefore, when used by powerful institutions, the term "community" might at times prevent considering the full scope of democratic participation, continuing asymmetric power relations, while at the same time pretending a progressive agenda built on transparency, collaboration, self-determination, and restitution. In that regard, we propose to use collection digitisation, in all its different practices, to develop ideas of social organisation that go beyond the idea of pre-existing "communities" and nationally or culturally defined societies.

As repeatedly argued in recent scholarly debates, museums need to be transformed if they want to become forums for diverse publics (Omar, 2020). This includes their digitisation projects. Indeed, as the MfN's digitisation effort is gaining visibility and publicity, new kinds of collectives and discourses can emerge. For example, TheMuseumsLab, an exchange forum for museum professionals from Europe and Africa, discusses museum objects as a starting point for debates on global equality and justice (TheMuseumsLab, 2022). But it is also important to recognize that many initiatives and developments dedicated to realising participation and redressing colonial legacies are happening outside museums. Efforts here include the International Inventories Programme (2021), which is building a database for Kenyan objects held in institutions across the globe. The research project Mapping Philippine Material Culture (2022) does the same for artefacts from the Philippines. Both effectively deploy digitisation to create new translocal collections while also allowing new forms of public engagement. Such digital spaces of exchange can potentially open up opportunities for the emergence of new kinds of knowledge and the transformation of exclusive Eurocentric and institutional imaginations of museums within the public sphere.

The change towards digital collections and data infrastructures might sustain and extend dominant power structures, but it may also open opportunities for reconfiguring discourses, practices, and standards. Thereby, museums as custodians of global collections can take this as an opportunity, and responsibility, to open the process of authorship and ownership to different publics, even ones that we are not yet aware of. On a discursive level, we therefore suggest shifting away from the inherently selective formulation of "community" and instead focus on the variety of publics that may emerge around the contested matter of colonial holdings. Contested issues and matters of concern (Latour, 2008) may play an active political role in creating new conditions for political participation which is not bound by locality or nationality. In that regard, museums have a role in creating experimental spaces for public engagement and action to emerge, within and outside the institution, in digital and material realms.

Digitisation processes can make specimens public and visible as matters of concern and can bring diverse stakeholders and their respective - and many times agonistic - interests into the technological process (Müller, *et al.*, 2021). Therefore, we suggest striving for and building on this ability

of digitisation to create these new kinds of forums to discuss and practise the transformation of collections in non-hierarchical, collective cooperation. On this basis, we aim for processes of re-working the data which are generated through research in the museum collection and charging them with historiographical, linguistic, systematic and taxonomic as well as logistical expertise from within and outside the museum.

Digitisation futures

In the previous paragraphs we highlighted some of the frictions emerging between the contemporary digitisation imperative and policy debates addressing the colonial contexts of museum collections. We argued that these frictions require theoretical, social and technological responses. The fact that natural history collections shaped and were shaped by colonial formations has been given little attention so far and has been thoroughly ignored in their scientific use. It is, therefore, crucial to acknowledge that digitisation processes are likely to duplicate the inequities and inaccessibility of collections, the reliance on Eurocentric concepts and standards and the effect of institutional as well as financial constraints. Institutional budget allocation also determines the expertise and experiences that are included or excluded in digitisation processes. Digitisation can easily continue the history of extracting knowledge and resources to enrich the institutional prowess and the accumulation of data. In fact, it is already impacting the discussion on physical restitutions of objects (DMB, 2021, p.87). Projects concerned with so-called "virtual restitution" are already taking shape (e.g. BOS, 2022; Reflora, 2022). However, these projects raise critical questions regarding their ability to facilitate accountability and negotiate various forms of digital and material restitution with diverse publics (Kaiser, 2022). Digitisation, we suggest, is an opportunity to investigate and redress past and present colonial formations while mobilising and including diverse publics in the institutional as well as socio-political transformation. It is a crucial point in time where we can stimulate an honest engagement with the material histories of collections and instigate new practices of science, accountability and restitution.

Digitisation strives to accomplish the monumental task of providing a synoptic view over millions of specimens in collections. Nonetheless, addressing colonial contexts with openness and accountability requires slowing down processes (Stengers, 2018), establishing collaborative and interdisciplinary methodologies for ongoing provenance research and enabling spaces for collaboratively developing

other, more equitable standards. What is often omitted in political and institutional rationales is the fact that to generate big data and provide long-term storage capacities requires human expertise and an enormous amount of financial, technological, and natural resources; e.g. energy supply and the massive extraction of rare-earth elements (Poole, 2010). These aspects also create a divide, separating between those who have and those who haven't the economic and political power to digitise as well as store, maintain and own data.

Digitisation can offer an opportune starting point to address coloniality and global inequality in the distribution of knowledge resources as well as epistemic and ethical injustice. The reworking and reconceptualizing of digitisation processes requires long-term institutional transformation. This means opening the possibility of vulnerability and meaningful learning and unlearning processes.

While keeping careful attention to expected barriers and conflicts, we suggest a few directions that would ideally be at the core of digitisation processes oriented towards these political and institutional goals:

(i) Conceptualise digitisation as a global research field. This includes devising new forums to address and criticise the digitisation processes itself.

(ii) Establish international and interdisciplinary teams and stimulate the involvement of diverse publics from the very early stages of digitisation.

(iii) Invest time and resources in mediation processes and the training of staff.

(iv) Make digitisation open, iterative and correctable. Allow for a maximum of transparency of information sources, including the preservation of original designations, languages, contexts of acquisition and storage logistics.

(v) Ensure sustainability and accessibility of the data and the digitisation process itself.

(vi) Treat sensitive objects with care, follow existing recommendations and collaboratively defined ethical criteria.

(vii) Enable equitable cooperation, for example through exchange programmes.

We see digitisation as a critical and political process that would, and should, instigate controversies

regarding the construction of data and context. This techno-social process may stimulate diverse publics that would take part and inform the discussion about the role of museums, the contested histories of collections as well as the very aim of digitisation itself. This is prerequisite for crafting digitisation as a new, dynamic and participatory museum methodology that potentially facilitates and challenges the core aspects of natural history scientific research - ordering, labelling, determining, comparing, defining, contextualising, debating - in an open and collaborative way, while allowing for epistemological and ontological pluralism.

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