

Infrastructure as digital tools and knowledge practices

Connecting the Ethnologisches Museum Berlin with Amazonian Indigenous Communities

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At first glance, the digitization of ethnological collections brings only benefits: More visibility and accessibility of cultural heritage, the possibility to allow the circulation of things beyond the confines of the museum, room for new interpretations, more information about objects and histories of collections and, last but not least, the creation of spaces for collaborative research and curation (Koch 2019). The list of projects worldwide that deal with digitized museum objects and directly involve *heritage communities*¹ has become long and more diverse (e.g., Hawcroft 2016; Mears/Wintle 2014; Rowley 2013; Salmond 2013; Srinivasan et al. 2009).

Given all the positive aspects and side-effects, one might wonder whether there is a catch, a hidden cost, any unintended consequences of those digital efforts. During his talk at the annual conference of the Chaos Computer Club, the art historian Lukas Fuchsgruber (2020) took, indeed, this direction, asking: “How can we interrupt the digital museum?”² The criticism suggested that discussions about the museums’ historic responsibility and new social role should never leave the digital out of focus or treat it like a universal solution when considering the colonial roots of these institutions. Fuchsgruber also mentioned the general danger that conservative claims of ownership rule the digital space – often disguised as open access policies (see Brown 2003, Graham and McJohn 2005; Carneiro da Cunha 2009) – and the interpretive sovereignty of the “universal museum”, all under the hypocritical guise of the so-called “shared cultural heritage”.

1 Producers, users and previous owners of the objects in the museum and their descendants, as well as people who are connected to the collections through their history and their cultural practices.

2 While Koch (2019) refers to the “digitized museum”, considering that a “digital museum” would belong to the realm of virtual reality, Fuchsgruber uses the term in a broader context of digitization of museum activities.

Considering that the digitization process does not solve by itself structural inequalities present in the very foundation of museum collections, risking even to increase them, how could we approach the digitization of museum collections and their potentials and challenges in a critical and, at the same time, constructive manner? In our contribution to this volume, we address this question from an insider perspective. In the first part, we describe the process and the results of the project *Sharing Knowledge* that started in 2014 as an initiative of the Ethnologisches Museum Berlin. Despite the existence of many other similar projects worldwide, this one was still a pioneering effort in Germany, where ethnological museums are neither among the forerunners of digitization nor have they historically had enough financial and human resources to build institutionalized, horizontality-driven relationships with heritage communities, apart from the efforts of individual curators. The field of digital collaboration was still relatively unexplored in Germany when *Sharing Knowledge* started.

Based on the experiences with *Sharing Knowledge* and in other initiatives held in Brazil (see Levinho et al. this volume; Fausto 2016), we developed the follow-up project *Connect – Comprehend – Communicate. Amazonia as a future laboratory*, which is the subject of the second part of this chapter. The partners of both projects are indigenous communities from the Amazon, a region that, with exceptions, saw little collaborative projects involving German or European museums (see van Broekhoven et al. 2011 for exceptions). Anthropologists studying Amazonia, especially those who are concerned with the “ontological turn”, are sometimes criticized for essentializing difference (Bessire/Bond 2014). We are aware of this critical discourse but nevertheless we are convinced that the claim of “taking people seriously” makes sense here because it means acknowledging different knowledge practices and object regimes when developing digital tools within ethnological museums. It is precisely the “otherness” of our indigenous partners that provokes us to rethink the design of digital infrastructures and to propose their radical transformation.

Infrastructures

Before proceeding, it is important to unpack two meanings of the word “infrastructure”. On the one hand, the term refers to “the basic physical and organizational structures and facilities needed for the operation of (...) an enterprise”, as pointed out in the Oxford dictionary for the English language. Museum infrastructures comprise their buildings, rooms, shelves, computers, software, and other specific items connected to digitization processes. On the other hand, we refer to a complementary, more pragmatic sense of the word, derived from social interaction studies. As a relational concept, infrastructure is a fundamental part of human organization, embedded in other structures, social arrangements, and technologies

(e.g., Star 2015). It is learned as part of membership in a given community of practice. It manifests itself as a set of embodied standards usually perceived as 'natural' by that community's members. In the context we describe here, we understand infrastructure as the way museums classify and organize their collections and make them available to the public (which includes digital operations like creating and managing databases, for example).

Although less visible, this second meaning of infrastructure points to something that is, nonetheless, as real as buildings, rooms, storage shelves, and collections. Someone who does not know how to handle an object properly might have no access to the museum storage, for example, or a non-specialist might not have writing rights in a database. According to Star (2015: 480), "many information systems employ what literary theorists would call a *master narrative* or a *single voice* that does not problematize diversity. This voice speaks unconsciously from the center of things" (Star 2015: 476, our emphasis). This voice includes and excludes, creates insiders and outsiders. In this sense, infrastructure is a "fundamentally relational concept, becoming real infrastructure in relation to organized practices" (idem).

Actually, it is the invisibility that makes the embodied infrastructure more encompassing. Whereas the physical infrastructure can be permanently updated – new buildings, new computers, new collections – the embodied infrastructure can remain inert throughout these visible changes.

Moments of crises – like the present times – make this inertia more visible and can force museums to fundamentally question their norms, standards, and doings. Building on Star's motivation to explore the *infrastructures' operations* – decoding the master narratives and exclusion mechanisms – our motivation is also deeply committed to justice and inclusion. In our case, it is about the museums' responsibility towards the objects stored in their collections and often no longer present in their original settings. With these considerations and commitments in mind, we focus on challenges and difficulties throughout this text, rather than on the success stories of digital collaboration inside museum infrastructures. We argue that it is precisely the problematic aspects that need to be taken into account when dealing with the digital museum. Or, to speak with Lukas Fuchsgruber, we propose, if not to stop, at least to interrupt and interrogate the digital museum so that its infrastructure becomes visible and the digitization contributes to the decolonization and critical contextualization of collections.

Learnings from the Sharing Knowledge project

The project *Sharing Knowledge* (2014-2020) was initially concerned only with a very small part of the Berlin collection from Amazonia, objects from the Guiana region (northern Brazil, southeastern Venezuela, present-day Guyana). Only a few of these objects had been exhibited or researched in the past. By far the more significant part had been stored away and untouched for decades. The project's intent was to use this collection to seek out indigenous stakeholders from different ethnic groups who would act as communicators between the museum and their communities and reintroduce the objects into their places of origin. The overall goal was to establish sustainable relationships of mutual benefit between the museum and the partners. The core of the project was the development of an online platform for collaborative research that would give the partners permanent access to the collection and the ability to add information and commentaries about the objects. We expected to improve the representation of indigenous perspectives in collections' research and exhibitions. The motivation for creating such a new platform was the perception that the museum's existing (digital) infrastructure, in both senses outlined above, was not designed for collaboration with heritage communities abroad.

At the time of the project's launch, only one public digital catalog existed for the Ethnologisches Museum's collection, as part of the State Museums of Berlin online presence, called SMB-digital. This portal extracted information from the internal database, Museum Plus.³ The database had been developed for all State Museums of Berlin and was based on art museums' general classification logic, with the artist or other influential individuals associated with the artwork at the top of the information hierarchy. Its use in the Ethnologisches Museum required local adaptations (Loukissas 2016).

Since a creator or artist was known only for very few ethnographic objects, the collector moved to the top of the information hierarchy, taken the place of the unknown indigenous creator, whose identity used to be subsumed under "tribal names" – a Māori necklace, a Nuer cane, a Baniwa pottery, and so on. Additionally, a thesaurus of object descriptions was created (for internal use, only), representing a first attempt to systematize the different names under which objects had been inventoried, and to move away from obviously colonial or stigmatizing terms such as "fetish" or "idol". References to the objects' origin (the place where they had been made and collected) were grouped under "geographical references". The so-called "ethnic group" was the last reference in this list. While the ethnic names are

3 At the moment of writing, Museum Plus had been transformed into a new, web-based application called RIA, basically with the same characteristics. A new version of SMB-digital, developed in the context of the museum4punkto project, was also announced.

still in the process of being standardized, materials are designated by vague entries such as “plant fiber”, “feather”, or “seed” for most objects from Amazonia. It is apparent that these collected things are “challenging objects [...] that confront existing theoretical frameworks” (Renn 2020: 80) and provoke new kinds of knowledge infrastructures.

Apart from all these hurdles, the main problem concerning transcultural joint research was that the entire digital infrastructure was only available in German and was not designed for accepting any external input. For this general situation, the *Sharing Knowledge* project intended to experiment with digital collaboration to pursue a model for a solution.⁴

The first laboratory

The partner for this ambitious endeavor was the Universidad Nacional Experimental Indígena del Tauca (UNEIT), a state institution of higher indigenous education in Venezuela originally founded by a Christian non-governmental organization. A few years earlier, Andrea Scholz had personally visited the institution as part of the field research for her dissertation. UNEIT is located in central Venezuela on the banks of its namesake river, the Caño Tauca. The initiative to partner with UNEIT for the project came from Andrea Scholz. She assumed that the historical material culture could be of immediate interest in the context of a curriculum that has an explicit focus on indigenous traditions and could contribute to building long-term and fruitful relationships between the Ethnologisches Museum Berlin and the communities. On her first visit to Tauca in February 2014, she was initially proven wrong regarding these assumptions. The students reacted very reservedly. One of the most impressive reactions was a student asking whether the museum wanted to steal the indigenous knowledge, given that it already owned their objects. It was not until the end of the visit that the conditions for future cooperation improved, after both parties got to know each other better during a video workshop and after finding common interests on territorial matters – Andrea Scholz’s dissertation subject (see Scholz 2012) –; and the approval of the University’s Council of Elders, to whom she submitted the collaboration project.

In August and September 2014, seven members of the indigenous university went to Berlin to get to know the collection and develop a concept for the planned online platform together with museum representatives. This conceptual workshop

4 Initially, *Sharing Knowledge* was part of the Humboldt Lab Dahlem (2012-2015), a shared initiative of the German Federal Cultural Foundation and the Prussian Cultural Heritage Foundation with the aim to test new exhibition and cooperation formats in preparation for the Humboldt Forum. See <http://www.humboldt-lab.de/> and <https://www.humboldtforum.org/>

was preceded by several days of intensive engagement with the objects of the collection, during which the students and one Ye'kwana elder recorded their observations on copies of the historical collection cards. The Humboldt Lab had commissioned an expert for data journalism and open-source projects to support the digital experiments. The prototype for the platform was developed by Studio NAND, a Berlin-based design agency.

The differences from the SMB-digital interface were substantial. The platform's starting page would be a map displaying the northern part of the South American territory. Drawing upon their social network experiences, the indigenous partners proposed symbols to describe sets of objects connected to one particular group (Pemón or Ye'kwana). Placing the ethnic origin in the first place was the first step to subverting the hierarchy found in the museum database. The chosen icons depicted graphic representations considered typical for specific contexts (such as the processing of manioc, the view of a communal house, etc.), and texts written by the students explaining some traits of the respective groups pop-up when hovering the mouse over the icons.

The second level of re-classification found was the general contexts of usage of a given object – e.g., 'hunting,' 'ritual' and 'household.' This information was not present in the Museum Plus database before, at least not in a systematic manner. Again, the choice of icons, now to group the many classes of objects, helped avoid privileging one language among the many involved in the project. In this aspect, the possibility to fill the platform using all relevant languages⁵ also became a requirement, and the possibility to add other idioms – from different interested indigenous groups – in the future.

In contrast to the database Museum Plus, which for ethnographica mainly provides only generic terms, each object was given a proper title based on its designation in the respective indigenous language. The platform also allowed integrating audiovisual media formats, which were positioned at the top of the object page to make it easy to find. The indigenous students Kuyujani Lopez, Kaware Martínez, Marakada Sucre and the elder Arturo Asiza suggested that it would not be satisfactory to describe objects on the platform through photographs and text alone. Objects live in practice – in production, in use, and in exchange, as also pointed by the available research on material culture in Amazonia (e.g., Guss 1990; Santos-Granero 2009). Moreover, video and audio files would open space to hear and see the elders – the highest authorities of knowledge at the UNEIT – talking about the objects.

Finally, the platform also stored all content-related information of the objects from the museum database considered relevant for the knowledge exchange inten-

5 Spanish, German, English, Pemón and Ye'kwana, from 2016 on also Makushí, Wapichana, Baniwa, Tukano, Kotiria, and Pāmiwa.

ded in the project. Also, technical data such as the inventory number and object ID were included to ensure the unique identification of the objects and the smooth export of data.

Reevaluating the laboratory

The changes made in the platform, thus, meant to reverse the previous hierarchy of information. However, in retrospect this was not a sufficient reversal. Despite reordering some of the attributes, keeping the ethnographic object as the central digital unit and maintaining the classification logic of the museum database proved to be a critical conceptual mistake. This approach left the exclusive centrality of objects untouched and failed to foreground relations and practices. That is what we are calling here the *inertia of infrastructure*. The unintended permanence of certain seemingly natural practices – the centrality of objects in the museum orientation, for instance – even when efforts are made to move things forward, incorporating more contextual information for every digital record.

Moreover, the second problem was that the platform never worked adequately at the UNEIT because the internet connection there was too weak to access the site reliably. The platform was relatively content-loaded due to the many multimedia files uploaded on it. Thus, what was first seen as a promising approach to give more life to the objects, resulted in connection problems; in the many senses of the word. Besides, the Humboldt Lab Dahlem as a temporary project proved too limited in time to host a permanent cooperation. The experiment had to go on to reach its self-assigned goal of sustainability.

The project's sequel started in 2016 and was further funded by the Volkswagen Foundation for four additional years – with new project partners in Brazil and Colombia by including another focus region, the upper Rio Negro in the northwestern Amazon. As in the case of the indigenous university, personal networks were decisive for the choice of partners.

With the newly added regional sub-collections and new institutional partners, the platform was expanded and supplemented, for example, with the function of an offline view consisting of html documents linked to each other. In particular, the partner institution in Colombia, the indigenous high school Escuela Normal Superior Indígena María Reina (ENOSIMAR) in Mitú (capital of the state of Vaupés), attempted to integrate the use of the platform and the Berlin collection into its educational program. The initiative came from Diana Guzmán, an indigenous teacher who also runs a community museum attached to the school, where she trains high school students to become teachers for the indigenous communities in the region. The objects from this museum were supposed to 'meet' and connect on the platform with the Berlin collections from the upper Rio Negro region.

Functionality and accessibility

So much for the plans; the digital cooperation did not match the expectations formulated at the beginning of the project, including those of ENOSIMAR. As before, internet access was limited; the offline version could not adequately replace the online version since it did not allow editing the content or searching. The interim solution found – entering information on paper forms, photographing them, and sending them to Berlin – proved to be cumbersome, mainly because the students could not directly see their work uploaded.

The UNEIT students' idea to represent elders' knowledge via audio and video files failed at ENOSIMAR due to limited technical know-how at the school. Although trained in a workshop, ENOSIMAR itself had neither the technical nor the human resources to work sustainably with audiovisual media.

Furthermore, more sensitive issues became apparent. In particular, the students kept their distance from objects connected to ritual contexts. This was in parts due to the situation that very few of them knew such objects from direct experience in their communities, and partly perhaps also because, from their point of view, knowledge and speaking about these things was reserved to specialists and older people, or that they considered their own knowledge to be too limited to speak about ritual objects (see Costa Oliveira & Scholz 2021 for a discussion on these matters). As far as objects from everyday contexts were concerned, however, the students were more interested in the physically accessible objects from the school's collection.

Despite these limitations, the project helped illuminate some shadowed aspects of the museum infrastructures. It was noticeable through the entries made for objects in the collection from Berlin that the specific place and context of acquisition – central questions for provenance research in Berlin – seemed to be of little relevance for the students (cf. also Scholz 2018). Although the information on the platform allowed them to see from which indigenous group and in which region an object was collected, they described the objects based on their belonging to a particular group and the lived practices in their community; focusing on production and techniques of usage, and on the mythical origins of these things, while not giving much attention to the historical facts which connect these things to the museum. This could have been foreseen, having the local infrastructure of ideas and practices on these objects in mind. Although made by a person who belongs to an indigenous group in the region, everyday objects are in large extent shared by these groups as part of the elements that give coherence to the regional system they live within – alongside marriage alliances and a body of ritual and mythological knowledge and practices they share. Describing techniques and, especially, attaching mythic narratives to something is a form of re-appropriating things inside this system (Hugh-Jones 2009; 2016). The object biography in the sense of its

connection to a German collection tradition was of less interest. Even the collector, who is so central from a European perspective, becomes a marginal figure according to this view (see discussion on expanding cultural biography in Costa Oliveira 2017, Costa Oliveira and Scholz 2021).

Data architecture

The experience with heritage communities shows that the knowledge about the objects and the provenance research is dynamic and open, part of a never-completed process. Thus, ideally, the structure of a database might cope with this dynamic, for example, by storing the editing history of an object. In the case of the *Sharing Knowledge* platform, the adoption of a MongoDB system, a document-oriented NoSQL database, allowed it to deal with these requirements. This choice enabled mapping the collaborative research on the objects. Users with the right to write on the wiki-inspired platform had only to explain their entries. Thus, all changes remained comprehensible. From a research perspective on how heritage works in a regional system, these registers could capture the almost invisible dispute of perspectives that characterize such systems.

The data structure choice also revealed unexpected issues. As we have anticipated, the central problem was that the information on the platform was centered on the artifacts. That choice conflicted with the indigenous view on these things once they conceive objects as part of broader contexts – linked to other beings like raw materials, places, myths, rites, spiritual owners and so on. In the platform's data architecture, it was neither possible to recompose this rhizome or network nor to render this different logic visible. Contrary to the original intention, and as UNEIT students initially feared, the project tended to appropriate indigenous knowledge, while the indigenous approach and valuation of objects remained invisible and marginalized in the museum's infrastructure.

Diana Guzmán also came to this conclusion in a final joint reflection on the work with the *Sharing Knowledge* database (see Scholz and Guzmán 2021): The structure of the platform was not suitable for adequately representing indigenous knowledge in its holistic and practical aspects; the input of data felt “cold” and disconnected from native forms of knowledge. As a result, instead of insisting on the original plan of digital collaboration, the project activities consequently shifted more and more to analog formats of collaboration, like hands-on workshops and other joint activities remote or on-site, in the indigenous communities or the museum – often supported by mainstream digital tools, such as WhatsApp.

Apart from the already described problem of exclusion of partners due to unequal technical prerequisites and unsuitable data architecture, at least two major

lessons can be learned from *Sharing Knowledge*: One regards sustainability, the other the distance between real-life and digital interaction (see also Scholz 2021).

Sustainability

First of all, due to its temporary nature the project did not make a difference in the museum's infrastructure or knowledge practice. The four-year grant from the Volkswagen Foundation was officially Andrea's postdoc project, which turned out to be far too small and marginal in terms of the museum's overall structure compared to its ambitious goals. So far, the indigenous partners' comments about the objects are still separate from the museum's knowledge practices. On the one hand, this was because a "way back" was not technically foreseen – it was up to Andrea to mediate possible incorporation of these data. The Museum Plus database used until then did not have any open interfaces; the data were imported and exported via Excel tables. In addition, due to a lack of resources, there was no possibility to convince the IT managers of the State Museums of Berlin, on whom the Ethnologisches Museum depends on these topics, to host the database after the end of the project.

During its runtime, the platform was hosted externally by the developers as part of a limited-time contract. Therefore, the platform met the typical fate of infrastructures built for temporary projects: With the end of the external financing, the website was also shut down. This means that the project missed bringing about a sustainable change in the way knowledge is produced in the museum and ultimately, in the way collections are handled. By adopting categories from the internal database into the platform, classification logics were unconsciously drawn upon "Western" knowledge practices. The low quality of the data exported from Museum Plus – due to the general lack of standards for controlling metadata on ethnographica (see Koch 2019: 328) – also prevented a further connection and feedback into the museum system. The inertia of infrastructures prevented indigenous knowledge from entering the "machine rooms" of knowledge production.

In summary, *Sharing Knowledge's* most relevant finding was to underpin the need for critical explorations of viable solutions that we commonly find for digital collaboration in Ethnological Museum settings. After failing to achieve transparency and the transformation of knowledge practices initially intended, there were many lessons to learn in practice. Therefore, based on the experiences described above on the one hand, and the insights Thiago da Costa Oliveira brought to Berlin from the digitization process at the Museu do Índio in Brazil on the other hand (see Levinho et al. in this volume), we conceived a new digital project that centers on infrastructures and knowledge practices.

Mediating complexity, transforming infrastructures

At the moment of writing this text, the new project *Connect – Comprehend – Communicate. Amazonia as a future laboratory* (in German language: Vernetzen – Verstehen – Vermitteln. Amazonien als Zukunftslabor, acronym V3) is in the process of being launched, delayed by months due to the COVID-19 pandemic and administrative obstacles characteristic of international collaboration projects. Therefore, the following part of the text describes the concept on which we based the project application. We will briefly outline here how digital collaboration is envisioned in this new context, particularly in light of the weaknesses and initial failures we identified in *Sharing Knowledge* and other experiences on digitizing ethnographic collections.

First of all, V3 is a joint project of several partners, three of them from the SPK (Prussian Cultural Heritage Foundation). Apart from the Ethnologisches Museum (EM), the Ibero-Amerikanisches Institut (IAI) and the Institute for Museum Research (IfM) are taking part. Other partners are the Botanical Garden/Botanical Museum Berlin (BGBM) and the National Museum of Rio de Janeiro (MN). Furthermore, the project includes a digital partner, the Urban Complexity Lab of the University of Applied Sciences Potsdam (FHP). The German Federal Cultural Foundation (KSB) provides the funding within a fund called Kultur Digital⁶ whose principles explicitly point to the expectation of an institutional transformation emanating from the digital. The digital tools developed in the project are to be adopted in four years by the partners and offered to other institutions for further development according to open-source principles. The primacy of sustainability is, therefore, already built into the project conception.

The overarching goal of V3 is to use digital tools to assemble and communicate the complexity of contexts, which in Western scientific knowledge practices are usually captured through categorization and decomposition – separated into distinct knowledge institutions, disciplines, and infrastructures. The approach is thus fundamentally different from that of *Sharing Knowledge*: While there the Ethnologisches Museum artifacts were the focus, V3 aims at the contexts and the relationships between different collections, encompassing much more than artifacts. While the previous project was focused on exchanging knowledge and improving descriptions of indigenous objects in museum databases, the current project aims to transform the infrastructures by creating a virtual environment where different communities of practice – indigenous, academic, museum public, and the like – can collaborate and learn with each other and interact horizontally, using a shared virtual curatorial space to be used by different publics, as we will see below.

6 https://www.kulturstiftung-des-bundes.de/de/projekte/film_und_neue_medien/detail/kultur_digital.html

Focus regions, collections, and socio-political dimensions

The V3 project aims to develop digital tools departing from a thematically and regionally limited case: historical-ethnographic and botanical collections from and about the Brazilian Amazon region. They have been collected over the last 200 years and stored, classified, conserved, restored, and researched at the EM, the BGBM, and the IAI. Up to now, they have been made accessible only partially and separately. The collections consist of artifacts, botanical records, maps, photographs, audiovisual recordings, scientific legacies, secondary sources such as archival materials and protocols of consultations, and extensive secondary literature.

In this project, we take these collections as a *shared cultural heritage*, in the sense of entangled histories, and propose to connect the collecting institutions to indigenous communities who collaborated to create these assets. As we know, not only ethnographic collections were based on research trips during which indigenous peoples collaborated (involuntarily in many cases), but also botanical, photographic, map, and literature collections were produced or collected under a similar relational framework (see Due Berete 2002; Françoso 2016; Costa Oliveira *forthcoming*, Martins 2021).

The indigenous populations who will participate in the project come from the *Sharing Knowledge's* network and the many long-standing collaborations of the Graduate Program in Social Anthropology at the National Museum Rio de Janeiro with indigenous communities, students, and researchers. More strongly than before, these processes will be opened to the German multicultural public and a broader audience on the part of the heritage communities. The project also addresses the German public interest in Amazonia triggered by the climate crisis, a new rise in nationalism in Brazil, and the perception that the region is a central place, where the so-called ecological commons are being threatened by capitalist overexploitation. Thus, the collecting institutions fulfill their socio-political role by opening up opportunities for a broad public to learn about this region through the historical and contemporary collections on Amazonia, the transformation processes inscribed in them, and the cultural knowledge related.

The focus on Brazilian collections also has an international cultural-political dimension beyond the public interest. In the devastating fire at the National Museum of Rio de Janeiro in September 2018, not only the collections held there were largely destroyed, but also archival materials and secondary literature. Part of the planned project will be to build a multidisciplinary, transcultural virtual platform that will provide access to the Brazilian research community connected to the National Museum and to a broader Brazilian public.

Co-designing digital tools

As we have seen, objects and media from the Brazilian Amazon are part of complex multidimensional systems and knowledge practices, though existing databases and online catalogs are ill-suited to capture this complexity, and the established conventions for classifying objects and their associated media conform to Western disciplinary criteria only. Furthermore, there is a considerable lack of tools to connect different scientific collecting institutions. The problems we faced in the Ethnologisches Museum Berlin are ubiquitous: The database's input formats (frontends) are not flexible with regard to different user groups, contexts of use, and types of entities.

Although all collecting institutions are formally committed to Open Access, their data are organized according to excluding logics and the tools in use are hardly interoperable. Besides, museums are set apart from libraries, let alone botanical gardens, natural objects from cultural ones, as well as the different research communities still insisting on their own well-trodden trail to truth. The lack of a common language to structured data makes the existing databases fall apart. The data they are supposed to provide cannot be found by standard web search engines. The user finds him/herself in the position of needing to know beforehand exactly where and what to search for to find what he/she wants to find. Collection interfaces are rarely generous (Whitelaw 2015) and associative explorations are hardly possible (Dörk et al. 2011, Kreiseler et al. 2017). The online catalogs are not suitable for transcultural nor transdisciplinary research or collaborative learning. They convey little context, i.e., the information is not sufficiently connected and embedded in larger data contexts. In what interests us, indigenous knowledge connected to these collections remains invisible; participation by a broader set of users is limited. Audiences remain primarily passive.

The digital and analog interfaces will be devised in a collaborative manner that places particular emphasis on the continuous involvement of relevant stakeholders (Dörk et al. 2020). The project's first step will be to create a unique and useful backend based on an existing open-source solution. This backend will store the project-relevant data made available by the participant collecting institutions. This data will serve as the basis to develop collaborative tools whose main aims are transcultural editing, all using sensorially appealing interfaces and visualization formats. There are three modes that afford distinct types of engagement with the collections. The *workbench* refers to an expanding set of flexible and context-sensitive tools, which allow users to work on collection data, linking them semantically across databases, and adding and retrieving information. The aim is that an object from the EM can be connected to a set of plants from the BGBM used in its fabrication. These plants could be linked to a map of Amazonian biomes found in the IAI, or a myth registered in a publication that explains these plants' non-human origin

and points to other regions, peoples, objects, and so on. The *wanderer* mode invites a diverse audience to venture into enriched datasets via exploratory data visualizations, making digital connections comprehensible and navigable for a broader audience. The connections established in the previous mode, will be possible paths for scholars and students alike, regardless whether in Germany, Brazil or elsewhere, including indigenous communities. While this mode is not centered on data entry, wanderers may also leave notes and observations as traces in the information space. Finally, all these connections and contributions will be made available in the third mode: the *wonderwall* animates the magic of collaboration, networked infrastructures, and connected data. On the web, in exhibitions and video projections, the visitors will be able to visualize the many interactions between other data workers and wanderers (anonymously), and the museum's digital entities.

These tools pursue an ideal of digital infrastructures that embrace relationality and a plurality of knowledge practices. Experiments with representation formats and visualization techniques create sensorial access to the collections. Offline solutions for communities that do not have permanent internet access and analog formats can be extracted from the digital platforms. All formats will be designed, tested, and iteratively adapted according to the results in several rounds with different internal and external groups of experts and users.

Conclusion

This text reflects the experience of six years of digital collaboration between the Ethnologisches Museum Berlin and indigenous communities in Amazonia, which led us to a beginning of a new project. Therefore, it is too early to draw any final conclusions. However, one thing is already sure: When we look back in four years and evaluate the project, we will have many projects in Germany to compare with this initiative, including the “Digital Benin” project currently underway under the leadership of MARKK (Hamburg), as well as perhaps collaborative tools to be developed specifically for provenance research on ethnographic collections. From our perspective, it is not the right way to stop the digital museum, but to critically observe it in the way Fuchsgruber proposed, going beyond its own efforts. Furthermore, forces should be bundled and constructive exchange between institutions established to sustainably transform digital infrastructures so that transcultural collaboration becomes an integral part of museum work, ethnological research, and cultural education. Undoubtedly, this is an arduous process, a struggle against the inertia of infrastructures. However, we are convinced that the Covid crisis will accelerate the evolution towards a reflexive digital museum, based on more communication between hitherto disconnected communities of practice.

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