Digital Archives, Knowledge Conflicts, and Epistemic Injustices in the Himalayas

Aarjav Chauhan
Department of Computer Science
University of Toronto
Toronto, Ontario, Canada
aarjav.chauhan@mail.utoronto.ca

Robert Soden
University of Toronto
Toronto, Ontario, Canada
soden@cs.toronto.edu

Abstract

This research examines the tactics employed by digital archive projects focused on Himalayan histories and cultures to navigate knowledge conflicts. While digital archives offer the means to provide visibility and increase the accessibility and recognition to marginalized communities, they inevitably give rise to knowledge conflicts, which may lead to epistemic injustices. Through interviews with contributors to Himalayan digital archives, we find that these projects attempt to navigate knowledge conflicts and address epistemic injustices by drawing on inclusive, participatory, and activist-oriented practices. We discuss the importance of surfacing conflicts when designing tools and practices for collaboration and cooperation within digital archives. Doing so, we argue, can help contextualize historical issues in the present and strengthen advocacy efforts against ongoing socio-environmental injustices. Finally, we highlight the opportunity for reconfiguring digital archives as digital commons to foster commoning practices and enable post-custodial, co-created, and self-governed archival infrastructures.

CCS Concepts

• **Human-centered computing** → **Empirical studies in collaborative and social computing**.

Keywords

Digital Archives, Digital Commons, History, Commoning

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1 Introduction

Digital archives, as information infrastructures, shape the pathways through which socio-environmental knowledge and histories are made accessible [70], influence how data and information is accessed, interpreted, and used by communities [64], and determine how their organization and function both enables and constrains opportunities for differently positioned actors [23]. In this study, we focus on digital archive projects that are working to represent the cultures, experiences, and histories of Himalayan communities. Understanding the issues faced by Himalayan communities necessitates examining how situated social and environmental knowledge has been marginalized — a form of epistemic injustice [13, 62, 69, 76]. Socio-environmental and epistemic injustices negatively impact the Himalayan region as systemic inequalities intersect with chronic and emergent uncertainties [72]. In response, communities in the region have developed situated strategies for coping with vulnerabilities related to social marginalization, knowledge exclusion, and environmental hazards [15].

Traditional knowledge and cultural practices in the Himalayan region, passed down through generations, have been central to managing social issues and sustaining ecological balance. However, rapid changes driven by globalization, infrastructure development, migration, tourism, and urbanization threaten to erode not only these localized practices but also the traditional knowledge systems that have long been vital for managing the region's fragile ecosystems. These transformations often privilege colonial narratives of development while disregarding local practices and knowledge that are critical for fostering both ecological sustainability and social resilience [15] — which we term as *knowledge conflict*. As a result, environmental degradation and social inequities are exacerbated, leaving communities vulnerable and their voices excluded from key decision-making processes. The Himalayan region, known for its vastness and heterogeneity, encompasses a wide range of cultures, languages, and environmental landscapes. The digital archives included in this study aimed to represent specific locations within this diverse region, capturing particular knowledge, histories, and practices rather than attempting to present the Himalayas as a singular or monolithic entity. We explore how digital archives depicting situated knowledge of the past and present can provide a point of reference from which to construct and evaluate future socio-environmental actions and policies that avoid the repetition of exclusionary and inequitable knowledge production efforts in the Himalayan region.

We depart from standard conceptions of digital archives as online collections of digitized historical materials, and view them as active sites of ongoing political, social, and cultural power and conflict [14]. In recent decades, archival projects have begun to explore community-centric models, where communities actively participate in curating and sustaining these initiatives in order to invert dominant hierarchies and catalyze belonging and shared authority in marginalized communities [14, 61]. Here, communities

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that have been historically silenced and excluded from validating their own historical narratives undertake a crucial role in constructing alternative histories that counter and unsettle the conflicting dominant and institutionalized narratives. As such, digital archive projects have needed to adapt to these changes by employing innovative strategies, often supported and mediated by participatory and inclusive technologies [22]. In doing so, digital archives offer new avenues to nurture collective memory and build possible partnerships and collaborations towards social and environmental justice. In this study, we explore the ways by which members of digital archives are navigating knowledge conflicts as they restyle themselves from static digitized collections to ongoing channels for enacting marginalized expressions and experiences, organizing collective action, and making alternative forms of knowledge production accessible.

The processes through which knowledge is constructed, validated, and represented are fraught with challenges and biases, including preferences for certain types of knowledge, the inclusion or exclusion of specific participants, and the technological and governance structures that either reinforce dominant knowledge systems or enable pluralistic worldviews. These biases are often reinforced by capitalist enclosures that commodify knowledge, limiting its accessibility and concentrating its production within dominant institutions, which undermines the potential for alternative community-led systems to emerge and flourish [34]. In response, communities throughout the world have adopted ways to self-organize to address needs and cultivate shared knowledge that is independent of the state and market [65]. The commons emerge through a collective impulse to improve existing conditions and practices sustainably. They are enacted in various arrangements and can be seen in cooperative farms, housing, and platforms; open-source software, design, and manufacturing; community forests; and peer-production online communities. A crucial aspect of the commons that makes them vital and robust is their reliance on embodied experience and situated knowing [7]. As such, understanding how a commons model intersects with knowledge production in the archives necessitates the existence of collective arrangements where community members collaboratively (re)produce shared commons [58].

Digital archives, for all their potential benefits, are inherently sites of knowledge conflicts. The ways in which these conflicts are addressed can significantly influence whether they perpetuate epistemic injustices or support epistemic justice. This research project draws upon prior work from critical archival studies on liberatory memory work and epistemic injustices in the archives [14, 20, 21, 61], as well as commons-based approaches of self-governance and shared stewardship [8, 39, 73] to answer the following research question: **What justice-oriented approaches are employed by members of digital archive projects to manage conflicts related to the knowledge collected and represented in archives?** We conducted interviews with members of digital archive projects that focused on representing various aspects of the Himalayan region. In doing so, we examined how members of digital archive projects responded to challenges related to maintaining the archives, engaging with local communities, and collecting, curating, and representing knowledge within the archives. Through this inquiry, we sought to understand the relationship between the design and maintenance decisions made within digital archives and the epistemic portrayal of Himalayan communities and environments within the archive projects themselves.

Our findings are organized around the *tactics* employed by the digital archive projects to manage conflicts that arose regarding the knowledge contained within the digital archives and the forms of knowledge production they used to address epistemic injustices in the Himalayan region. First, we highlight the ways by which the members of digital archives navigated the complicated nature of openness to the archives as they shifted towards adopting open-source technologies and public domain infrastructures in their efforts to make these projects open and relevant to local communities. In doing so, we find that they encountered conflicts related to metadata schemas, technical labor and expertise, and maintenance of the archive projects, particularly when debating the use of proprietary technologies and institutional repositories. Second, participants discussed the conflict between having accessible content online and ensuring that the information was meaningful and useful to the communities represented in the archives. Here, we observed that the digital archive projects employed community-centric and participatory approaches to bridge the gap between the goals of the digital archives and the community members. Third, we found that digital archives focused on reconstructing lost histories and addressing silences by supporting non-dominant forms of knowledge production that were often in conflict with broader historical narratives in the Himalayan region. Lastly, we identify that participants attempted to ensure that the digital archives were not passive repositories of archived content, but rather dynamic mediums through which marginalized communities could organize and advocate against social and epistemic injustices.

As a result of having identified these tactics, we note the potential of surfacing conflicts throughout the design process within archival projects. Building on previous HCI research on conflicts and online environments [17, 36, 42], we argue that enabling arenas of conflict and co-operation is essential for the archives in ensuring that communities can re-contextualize past injustices in the present. To do so, conceptualizing digital archives as dynamic and collaborative online communities rather than passive collections can support designers to draw from other HCI approaches and methods that aim to create participatory online environments where members can negotiate, debate, and cooperate on conflicting matters. We suggest that digital archive projects and other cultural heritage initiatives can be better equipped to address epistemic justice issues by embracing conflicting narratives and spaces as potential areas for design interventions. This approach is particularly valuable for digital archive projects, as it allows them to implement practices aimed at carefully undoing past mistakes [70] and to design novel techniques that incorporate policy into the design process [50], considerations traditionally overlooked by colonial archives.

In uncovering the tactics employed by the digital archives, we noticed that they could be better positioned to address the knowledge conflicts if they were designed as digital commons-based archives. In this study, we adopt a commons-based lens to: (1) acknowledge the enclosures, extractive practices, and creation of hierarchies, that constrain the democratic production of knowledge within digital archives; (2) examine the ways by which digital archive

members are attempting to navigate the knowledge conflicts that arise through their efforts to incorporate historically marginalized communities, communal relationships, and subaltern collective memories against prevailing historical narratives; (3) provide ways by which digital archives can be designed as a digital commons and nourish commoning practices as a means to shape alternative curation, governance, and management structures. Here, we posit that these digital archives already incorporate features that are shared with other commons-based arrangements. Conceptualizing digital archives as ongoing commons infrastructures that continuously enable subjective encounters and foster relationships between other archive projects, communities, and institutions can pave the way for envisioning community-led forms of authorship, access, and management. These approaches de-center the traditional roles of the archivist and designer, and reinforce the agency of communities in claiming their history and culture.

2 Related Work

2.1 The Knowledge Politics of Digital Archives

Coming to an exact definition of *digital archives* is a challenging task, even more so in recent times as the study of archives has extended beyond library and archival communities. As noted by the philosopher Derrida, "nothing is less clear today than the word *archive* [25]." The most prevalent way of understanding the archive has been by referring to it as the "contents of museums, libraries, and archives and thus the entire extant historical record" [56]. The archive is also studied as a theoretical concept for examining archival practices such as the nature, management, and usage of records. Here, the works of Foucault and Derrida have been pivotal in shaping contemporary understandings of archives. As per Foucault, archives are instruments of control that initiate at a system of *utterances* or statements [53], wherein "the archive is first and foremost the law of what can be said, the system that dominates the appearance of utterances as singular events [38]." Derrida's psychoanalysis of the archive focused on the contingent nature of the archive, i.e., the importance of understanding socio-political and technological forces that constitute *archivization* methods that ultimately shape the archive [25]. The concept of the *digital* archive further muddled the concept, boundaries, and possibilities of the archive as it introduced the *digital* to the already heterogeneous notion of *the archive*.

Digital archives, for the purpose of this study, are web-based initiatives for gathering, hosting, and disseminating curated information, including cultural heritage, historical events, stories, and knowledge. These archives consist of a set of digitized resources, along with associated technical capabilities that allow for affordances such as the ability to create, search, and use information [10]. Digital archives have been useful in presenting and organizing digitized objects that were previously difficult to access, index, and search due to their multimedia capabilities, methods for categorizing and managing information within them, and large storage capacities [28]. The digitization of archived material has also been vital in advancing and refining approaches with respect to historicism and their relationship to social order [31, 56]. Within the HCI community, Soden et al. have argued for exploring new ways of examining the relationships between information infrastructures, archives, and historicist methods since "techniques for ordering information and archives are also techniques for knowing and managing people [70]."

The myth that an archive is a *passive and neutral* record of events has been long challenged by philosophers and critical theorists [51]. The politics of knowledge shape how information is represented and transmitted within and beyond the archives [14, 25, 61, 70]. This is most apparent in the construction of institutional archives, wherein structures of power shape, collect, and preserve archived records, leading to an archive of curated information that is often disconnected from contemporary contexts and not yet integrated into meaningful narratives [14, 51]. By doing so, such models of archives perpetuate epistemic injustices and erasures by prioritizing dominant interests and hegemonic historical narratives and extractive collecting procedures [21, 61]. However, archives hold the potential to be activated, interpreted, and transformed into *liberatory memory work* [14]. Caswell elaborates on the criticality of a power analysis within analog and digital archival practices in order to achieve liberatory memory work that can "release societies from cycles of violence, prejudice, and hatred" (p. 13) through deliberate and ongoing approaches that are participatory, allow for shared stewardship and multiplicity of viewpoints, are explicitly activist and reflexive in orientation, and are relevant *for* communities rather than passive collections *about* communities [14].

2.2 Digital Commons

Commons are a form of social organization of governance through which common resources (re)emerge and (re)produce [39]. The commons are based on ideals of collective action and community-led governance that lead to durable social systems which produce shareable resources and activities [7]. The commons model has been pivotal in shaping alternative arrangements of sharing, exchange, and production against growing frustrations with the hegemonic and extractive technocratic practices of privatization and neoliberal capitalism [39, 65]. In this study, we focus on the digital commons, i.e., the application of the commons model of governance and production to intangible resources such as information, culture, and knowledge within and supported by online environments [24, 48]. The concept of the digital commons has been useful as a theoretical and practical lens to critically analyze and advance open, participatory, and egalitarian digital environments and technologies [4, 30, 48]. Movements such as the open-source software, free culture, and open access to science, along with the rise of digital communities such as commons-based peer-production communities and platform co-operatives, are exemplifications of successful digital commons initiatives [7]. Digital commons models have, in particular, been of interest to scholars and practitioners due to their non-rival nature. As such, the means of maintaining and sustaining against threats of pollution, enclosure, underproduction, and degradation are distinct from traditional commons arrangements around tangible resources.

Our research explores the possibility and potential of a digital commons arrangement in terms of the cultural resources that manifest, sustain, and evolve over time within online environments. Scholars have also used the term *cultural commons* to describe "cultures expressed and shared by a community" [5]. The cultural

commons have also been discussed as a vital part of the public domain, i.e., the representation of cultural and creative works that exist beyond copyright enclosures [60]. A useful example here is the GLAM-wiki (Galleries, Libraries, Art, and Museums) initiative, which advocates for the adoption of digital commons models in the digitization of cultural heritage by removing legal, technical, and economic restrictions on the (re)use of resources by the public [24]. Conversely, the ideas of openness and remix culture prevalent in the debates about the cultural commons have been critiqued for advocating for a global commons model where the multiplicity of cultures is generalized [18]. Christen rather argues for tightly stewarded digital spaces where local communities can be empowered to "invigorate their own local information regimes" [18].

Design scholars have previously explored how HCI can contribute to the design of cultural institutions by creating participatory engagements with communities. Here, research has sought to create a theoretical link between infrastructuring, i.e., the co-creation of emergent resources for participation, with the collaborative and peer-to-peer practices found in commons-based digital cultural heritage preservation initiatives [59]. The potential of HCI lies in exploring how infrastructuring can support and be useful as an analytical tool in cultural heritage projects, like digital archives, in designing sustainable infrastructures by identifying the tensions and challenges that manifest within these initiatives [59, 60]. Our study builds on this recent work on cultural heritage projects by examining the knowledge conflicts that exist within digital archive projects as they attempt to contextualize social and epistemic justice issues of the Himalayas in the present and the ways by which HCI can support digital commons-based non-institutional archives that are curated, managed, and governed by a community.

2.3 Conflicts in Online Communities

HCI scholars have extensively studied the benefits, drawbacks, and mechanisms of conflicts within online communities such as open-source software [32, 36], and peer-production communities like Wikipedia [2, 3, 42] and OpenStreetMap [17, 45, 54]. Within online communities, conflicts emerge due to various reasons, such as automating processes through bots, required standardizations of data, and interpersonal conflicts as they attempt to balance autonomy, motivations, and participation of their members with the meta-data schematics, practices, and policies of the community. Online communities, in particular large collaborations such as OpenStreetMap, also have to deal with conflicts that emerge as they bring together heterogeneous and conflicting social worlds together [54]. Fiesler et al. examined how conflicts over values were navigated in the open-source, community-governed digital archive - *An Archive of Our Own* [35]. They highlighted how community-led design decisions can serve as a mechanism for managing conflicts within online communities.

It is important to make conflicts and tensions that are prevalent within online projects explicit. This allows for social issues to be made visible and creates space for negotiating, discussing, and considering future directions of online communities [29]. Fillipova and Cho state that it is critical to elucidate different forms of conflict as they have "differing and complex relationships" with the outcomes of the community [36]. Certain forms of conflict, such as affective conflict in open-source projects [36] and value conflicts in peer-production communities [16], have been found to have productive and generative outcomes for online communities. Recent work has also explored the need to surface conflicts within participatory design, noting that doing so can create spaces for constructive design [41]. Of importance, design scholars have argued for agonism as a way to convene a community over shared concerns and navigate conflicts by supporting diverging views, collaborative renegotiations, and democratic design practices [6, 33]. The agonistic approach has particularly been useful in creating public spaces that shed light on structures of power and unjust subjugations upon marginalized communities [6, 26]. Similarly, design scholars have emphasized the importance of addressing social injustices by partnering with oppressed communities and exploring how epistemic conflicts in online spaces can serve as a framework for understanding exclusions and designing inclusive, equitable environments [1, 29].

Participation in a commons ecosystem necessitates ongoing collaboration, consensus building, and cooperation, with conflict management being an inevitable part of the process. Conflicts have been a crucial aspect of commons theory, stemming from the initial focus of necessary *Conflict Resolution Mechanisms* within successful commons-based arrangements around tangible resources [65], to more recent formulations of conflict within the digital commons [42]. Commons scholars have argued that focusing on conflicts, and conflict resolution strategies within commons arrangements is a way to understand the functions and transformations within their governance [8, 63]. In recent years, participatory design scholars bridged the concepts of conflicts and the commons by noting the crucial role participatory design can play in "nourishing the common" by paying attention to the patterns of social organization and social relationships [71]. Other works in HCI has argued for designing commons-based and collective cultural heritage production approaches as a way to navigate tensions related to open access, knowledge practices, authorship, and ownership within digital cultural heritage infrastructures [59]. In this study, we draw on commons theories to understand how members of digital archive projects navigate conflicts related to the knowledge collected, stored, and represented within these archives. In doing so, we show how their tactics align with the approaches and practices of the commons and propose ways to design digital commons-based archives that incorporate democratic forms of knowledge production.

3 Research Approach

In this study, we conducted ten semi-structured interviews to understand the perspectives of individuals involved in various Himalayan digital archive projects (Table 1). The archive projects aimed to collect, document, and disseminate diverse forms of knowledge from the region. They included topics such as ethnographic materials, historical media collections, folklore, environmental conservation, and indigenous cultural practices. The participants held various roles within these projects, including archivists, designers, curators, researchers, and developers. This diversity in roles allowed us to understand a wide breadth of perspectives and expertise that shaped these archives. Some participants prioritized a close and personal

connection to the cultural materials and communities represented in their archive, while others took a more research-oriented approach to understand historical documents and experiences of communities. The participants also varied in how embedded they were within communities. Some worked directly with local communities and aligned their archival practices closely with the lived experiences and knowledge of these communities, while others relied more on institutional archives and colonial-era materials and focused on contributing to critical discourse about historical narratives. This range of roles and relationships allowed us to explore diverse intersections between archival practices, community engagement, and knowledge representation. By doing so, we were able to examine how different approaches to community involvement shaped the design, maintenance, and goals of the archive projects.

Participants for the study were recruited through existing connections with the research team and Internet searches. Additional participants were recruited through snowball sampling. The interviews lasted roughly an hour. Interviews were conducted and recorded online and were then processed using transcription software. The transcripts were corrected manually by the first author. The interviewees included Himalayan locals from India and Nepal, as well as individuals affiliated with North American universities (USA and Canada), some of whom had ties to both regions. The collected data was securely stored on an encrypted, password-protected platform to ensure the privacy and confidentiality of the participants. In line with ethical guidelines and regulations, we ensured that participants were treated with respect, dignity, and fairness. All data presented in this paper has been anonymized and is non-identifiable. The interview protocol was designed to cover the following topics: 1) overview and history of the archive projects; 2) information practices employed within the projects; 3) the user demographics and interactions with the projects; 4) the maintenance, design, and challenges faced in the archive projects; 5) community engagement strategies; and 6) the approaches adopted by the projects to represent and address social and environmental issues specific to the Himalayan region. The interviews were crucial in understanding the decisions made in the construction, maintenance, and design of the digital archives, as they provided insights into the ways by which the archive projects interacted with communities who were represented in the archives as well as external collaborators such as local artists, researchers, and institutions.

The interview data was analyzed using reflexive thematic analysis, as developed by Braun and Clarke [11]. As per Braun and Clarke, reflexive thematic analysis can be used across a range of data types and is most useful in introducing the "subjective skills the researcher brings to the process" [12]. We started by familiarizing ourselves with the data by reading through the interview transcripts. This was followed by an initial round of coding. Codes, in reflexive thematic analysis, capture single ideas associated with a particular section of data. The coding process included the exploration of meaning across a spectrum, from more obvious and surface-level understandings (semantic) to implicit and hidden (latent) interpretations. Codes were named such that they evoked analytic interest in the data, based on our research question. The interview data was coded along using a qualitative analysis software tool. The initial code-book consisted of seven codes: knowledge enclosures, forms of community/external engagement, purposes of the archive, technological practices, countering enclosures, countering historical narratives, and challenges in designing the archives. The first author conducted multiple iterations of coding. Next, the first author shared written familiarization notes of the data and conducted multiple discussions with the other author regarding initial interpretations of the data. Following the coding process, the authors generated themes that captured shared patterns of meaning "characterized by a central concept or idea" [12]. Through this process, we noticed that the themes were more appropriately framed as specific *tactics* employed by the digital archives to navigate different forms of knowledge conflicts. Subsequent meetings were held among the authors to review and finalize the identified tactics, after which brief summaries were written, including excerpts from the interviews. Following multiple rounds of revision, reorganization, and discussion, we addressed the research question by drawing on the tactics outlined in Section 4.

4 Tactics for Managing Knowledge Conflicts within Digital Archives

4.1 Complicating Notions of Openness in the Design of the Digital Archives

Several participants noted that, as their digital archive projects and collections grew, they sought technological solutions that offered ample and affordable data for storage, as well as stable and secure data hosting services that minimized their technical labor. Some projects tended towards utilizing institutional digital repositories, usually offered by western universities or proprietary hosting solutions such as AWS (Amazon Web Services). Hosting digitized archived material on external institutional repositories and proprietary systems created tensions related to ownership and accessibility of the archived information, as well as agency of the archive project members. Interviewees acknowledged that although proprietary systems were convenient for providing reasonably stable technical architecture and data storage to host and maintain archived material, managing information on these platforms often imposed barriers due to their centralized structure. Issues such as the high cost of hosting and lack of flexibility in the means to manage, store, and access archived data rose from using these systems. P1, who had founded their archive project in 2000, shared the challenges they faced while transitioning their digital archive from a self-hosted setup to an institutionalized digital repository:

> *"One is the census page of Nepal, and the other is the Nepal maps interface. The census page and the maps interface both have a little bit of kind of PHP and I think MySQL or something in the back end. That functionality is now heavily outdated, the census itself 20 years old, but it's useful. And the Nepal Census Bureau has never hosted this stuff.... I'd like that functionality to remain. And most of these institutional digital repositories and library systems can't handle something like this. They can handle only flat files, not interactive files. So that's a question: what to do about it?"*

Centralized digital repositories, as described by the interviewee above, enforce various layers of control over what content is accessible, the criteria by which hosted data is standardized, and policies

Pn	Role in Archive Project	Goals of Archive Project	Media Types in Archive Project
1	Founder, primary archivist	Archiving and making available ethnographic materials spanning the Himalayan region	Visual and audio collections, maps, journals, books, newspapers, music, and movies
2	Founder, primary archivist, designer	Ethnographic documentation of folklore from the Western Indian Himalayan Region	Visual and audio collections, scripts, languages, and maps
3	Research coordinator	Documenting and enabling social change in Nepal by bringing together photographers and storytellers	Photographs
4	Founder, Executive Director	Documenting Nepal's history and culture by curating, digitizing, and improving accessibility to digital resources	Visual and audio collections, journals, books, and documents
5	Researcher and archivist	Documenting and researching Himalayan mountaineering expeditions	Photographs and journals
6	Founder, Information Manager	Digital repository spanning the Hindu Kush Himalaya Mountain Range	Documents, books, research papers, and journals
7	Founder, researcher	Fostering critical engagement and dialogue in Eastern Indian Himalayas by creating alternatives to colonial archives	Photographs and art
8	Founder, researcher, curator	Documenting and enabling social change in Nepal by bringing together photographers and storytellers	Photographs
9	Founder	Raising awareness of the Himalayan environment and bringing together scientists, social activists, and common people to save the Himalayas	Books, journals, and maps
10	Co-founder, director	Create new models of biodiversity conservation and environmental learning in eastern Nepal	Indigenous knowledge and art

Table 1: A table outlining the roles of participants within the archive project, goals of the archives, and the types of media included in the archive projects.

over how archived information can be utilized and re-mixed for other work. Deciding on how to host archival data creates additional challenges of maintenance and technical burdens of updating software configurations and keeping meta-data standards up to date. These challenges were especially prominent in older archive projects that were initially developed on early self-hosted web infrastructures. P9 conveyed how software dependencies and continuous updates often brought their digital archive website offline:

> *"We have a webmaster, I guess, is what you call them, in India, who does all the technical work of keeping the website up and running. And the same guy has been involved the whole time. But off and on, we've switched from one software to another or one web host to another. And we faced various problems, you know, keeping the whole thing running. Once in a while, somebody's software goes out of date and doesn't work anymore. And so then the site is down for a while, and eventually we find a replacement, and we rebuild it and get it going again"*

The reliance on proprietary software and web hosting services, combined with frequent updates and changes to functionality or terms of service, can lead to significant disruptions in the project's continuity. The resulting downtime and the need for adaptation place considerable strain on the members of the archive projects,

who must navigate both technical hurdles and the complexities of managing evolving digital platforms. These technical dependencies are particularly pronounced in community archive projects that often operate with small teams, where the burden of maintaining and updating systems falls on a limited number of individuals. P6, the lead technical expert of their archive project, elaborated on how these constraints amplify the difficulties of managing technical upkeep:

> *"In a sense. I am alone, working with [Archive Project]. And the challenge in the job is this gap between this developer and content managers. And so basically, we face challenges with the software. The problem comes again when we have to [re-train] with the new persons or a change in technologies. So we have faced that problem. We have chosen a software, that is free and open source software, which also requires updates with different licences."*

As such, the participants described digital archives as ever-changing technological assemblages. Their underlying infrastructures required continuous maintenance and re-visitation. P1 confided that maintaining their collection online on a self-hosted website was becoming too difficult. They suggested that they might have to retire the front-end website altogether and move the collections to a public domain repository so that it could be easily accessible without the need for continuous maintenance:

> *"So there's the [X] website, there are files that sit on the Himalaya server in the Department of Anthropology at the University of [Y], which I still have access to the FTP, and then there's the D-Space repository, which is kind of all of the big data, much of which is far too large to stream through a website. And I'm really imagining a time in the not too distant future when the front-end of the digital archive will essentially be retired. And the collections will live on in another another place"*

As a response to the enclosures of data and access as well as the subsequent challenges arising from using institutional repositories, several participants noted the importance of prioritizing access to local communities and providing local technical expertise to other archive initiatives in the Himalayan region. For example, P4 explained the rationale for founding their archive project with the goal of increasing digital accessibility to Nepal's history and culture:

> *We are focusing more on the technology part of archiving rather than the process part. Because that's where the main gap is. There are lots of organizations that have been scanning, they have the physical location, but the place where they fail, or they don't have the expertise is the digital part. Like, where do I store and how do I make things accessible? And that's where they need this expertise from [western] universities [repositories]. That's where I think we want to break that barrier. And we want to be that archive where local communities store their materials... Because our view is, once we solve the technology issue, once we make it accessible for others, we would be able to partner with lots of local organizations, and save money for them as well, because we're talking about Nepal, one of the developing countries... archiving is like the, back-back-back burner for the government.*

Understanding what openness to the archives entailed was central to determining the relevance of these projects to the communities represented within them. Several participants noted *open sourcing* of the projects as an important step in fostering collaborations across other archive initiatives in order to minimize dependencies on proprietary systems and make the archive collections relevant and accessible to communities. For example, P9 stated the use of open repositories maintained by larger consortiums such as archive.org or Zenodo as a way *"for our material to be sustained for the long term"*. However, participants also expressed concerns about the potential for open access to enable extractive practices and suggested solutions such as restricted login access and verified membership as ways to ensure that local communities had agency over the archived materials. P2, explaining their decision to restrict access to folklore music recordings in their project, stated:

> *"And so I want to emphasize the question of how is the archive discoverable and accessible. Do you have restricted spaces in the archive for certain logins, etc? Or is it openly accessible for all because I kind of want to raise conversations on openly available data about archival material and how that relates to a culture of being represented in certain ways and how people feel about that, too. So just kind of really, discussions about accessibility to the site. And I think that there needs to be like, a certain level [of restrictions], and being mindful about what you can or cannot portray, or like, how much might be extracted and used by other people, or exploited by other people."*

Members of the digital archive projects were attracted to open-source and public domain infrastructures as they offered long-term sustainability by ensuring that the content remains accessible 'indefinitely'. P1 and P9 highlighted the 'permanence' of such platforms, noting that *"anything you put there will never go away"* (P9) with the ability to update collections while preserving older versions. Several participants, like P3, approached openness in a more bottom-up way that was tied to the communities. They stated:

> *"When we need to work with people, one very important thing for us was to is establish and maintain relations and solidarities. So it's, it's not just a matter of access, it's also a matter of bringing people together."*

Despite the technical advantages of using open-source technologies and public domain platforms, such as the ability for continuous revision while maintaining historical records and a reliable and free option for hosting digital archives, members of the projects were cognizant of the challenges when navigating *access* to the archives. As a result, they turned their focus to using these infrastructures to engage communities directly in their project, which we discuss next.

4.2 Engaging Local Communities as Partners

Caswell explains that professional archivists must prioritize "outreach, access, and engagement" to articulate "their importance to the communities they serve and represent" if they hope to dismantle extractive archival practices and engage in liberatory memory work [14]. A critical issue raised by participants was the lack of access to the digital projects for the communities from whom the materials were originally collected. P1, when discussing an initiative where they organized community gatherings to share old footage, shared the importance of community engagement, *"even published materials and films, photographs and books were rarely in the hands of the people from whom they'd been collected in the first place."* This highlights an equity issue, where the very communities whose resources contributed to the archive's construction through collaborative practices are often excluded from engaging with the archive project and its digital collections.

Several participants stated that their digital archive projects included initiatives to bridge this gap, such as by creating "learning rooms" (P10), where community members could access and interact with the digital archive. P10 created their archive to help locals in eastern Nepal preserve traditional agricultural and land practices. However, they highlighted a significant issue where the communities whose cultural heritage was showcased online often could not access the archive due to a lack of connectivity and resources. They stated, *"we don't have like a way for them to immediately come and start looking through and viewing the videos."*

Deciding what content should be hosted online brought its own set of challenges for some participants, such as hosting sensitive cultural information and surveillance. P1 explained that they did not host all collected information online. They explained, *"Fieldwork, primary fieldwork notes; we never actually hosted much of that because that seemed far too sensitive."* They elaborated that, *"we weren't usually taking primary data and just slapping it online; I think that would have felt quite inappropriate."* P8 also noted, *"we really feel like it should go online, although there are a lot of other concerns, including, you know, data, surveillance, all kinds of things that are, you know, piling up with this kind of work."* These concerns can further distance local communities, as they are unaware or have limited to no agency in deciding what archived materials are presented online.

Archival practices that exclude local communities can lead to voices missing from the historical record and can make cultural heritage vulnerable to loss. For example, P4 raised concerns over the lack of local community involvement historically within archival work in Nepal and the challenges it created after the 2015 earthquake:

> *"There are lots of old heritage sites as well as temples there. So during the earthquake, most of them got destroyed. So when there was a government bodies setup to recreate it, they didn't have any kind of document about the structure and the design of it. Not even the archives or the museum had any of those documents. Those documents were found in international museums and archives, and lots of international folks who have like traveled there, or the tourists that have traveled there has taken pictures in the 1900s. So they used those documents, to recreate most of the elements and temples over there. So that kind of opened the question about, you know, what are we doing about archiving in Nepal?"*

The digital archives employed participatory approaches such as workshops, training people in archival practice, and having physical spaces as a means to open the archives to community members. Creating such spaces, outside the boundaries of the digital infrastructures of the digital archives enabled new forms of engagements and interactions and sharing of knowledge between members of the archive project and community members. Several digital archives used oral and storytelling workshops as a way to include community members in the curation of archive materials. Overall, such approaches were useful in ensuring that the archive's content was meaningful and relevant to the communities. These initiatives were also pivotal in building collective memory and supporting inclusive dialogue and collaboration among various stakeholders beyond the community, such as professionals, researchers, and practitioners. Of note, P10 elaborated on the success of a training program that they had initiated to introduce youth from the communities into the archival project. They stated that this initiative garnered experiences and approaches from the community that were unknown to the digital archive project members:

> *"The youth Fellows program, so actually training them and building it so it's their archive... And they're building in a way [that] even I don't have the information about it. So I think that is really, really integral for us, like the who is documenting and how has it been documented? And then again, giving back to the community.*

Several projects held public exhibitions as a way to engage the wider community with the archived content, and as a medium to curate and share historical narratives in a physical space. P8 discussed the purpose of public exhibitions:

> *"When we do the exhibition, that's where we really think of the archive and the activation of the archive in terms of how you know, what kind of interventions can be made or need to be made in terms of public memory."*

Facilitating physical exhibitions for digital archive projects offered a unique approach to storytelling and community engagement. For example, P3's responsibilities in their archive project included designing archival initiatives, research areas, and methodologies for engaging with communities. They explained, *"The first is what we include in the archive, and then after that, we think about how do we go about curating this exhibition."* Here, the curation process is distinct from simply displaying the entire collection online; instead, *"the curator acts like the director"* (P3) and carefully selects specific materials to craft a narrative. P3 further elaborated, *"Not everything that we include in the archive is in the exhibition,"* as the curator considers, *"What is the story that we want to tell? What is the narrative that we want to tell from these specific pictures?"* This selective storytelling provided a way to make the historical and cultural significance of the materials more accessible and resonant with the present, and importantly, was a way by which the community members could connect with the goals of the digital archive.

Including communities within the practices and activities of the archive proved valuable for members of the digital archive projects,

as it created spaces for questioning, self-critique, and more in-depth understanding of their reflexive positions as digital custodians. This allowed them to better address their obligations to represent the culture adequately and engage in meaningful dialogue with the community. P7 conveyed their sentiments when archiving sensitive histories:

> *"I realized after a point when I wanted to work on these stories, it was not fulfilling for me, like when I went out to conflict affected families, and I was telling this story, and I was writing it in terms of how we trained to write, it was not fulfilling for me ... So it's also I think, finding those alternative spaces where you can, while doing your academic, rigorous work as the market demands to be able to have that kind of a space. Which is where I think I was also interested in the [digital archive name] collective was that it looked like a possibility of creating this alternative space, where we can do this kind of a work, where it could be fulfilling and where, when I gave the stories back to the people who had given me their stories, it made sense to them, like, you know, it wasn't a language which they could understand"*

In addition to the unique narrative possibilities offered by physical exhibitions, their importance lay in creating spaces beyond the digital boundaries of the digital archives, where people could gather and engage over shared community concerns. Several participants stated the importance of these spaces in sustaining collective efforts over the long term. P7 shared, *"We've just taken up a space, and we've built a small gallery from our own personal collection... we want to be able to create that into a larger public space."* P7 further stated that these physical spaces provide a *"safe space... where we can have these kinds of dialogues [and] conversations"* and *"offered a platform for otherwise marginalized voices."* Such spaces also enabled the digital archive projects to recruit and collaborate with other professionals, researchers, and practitioners.

Some digital archives used online interfaces such as comment boards and open blog pages to foster interaction and engagement with their communities. For example, P9 described how their platform added a section for comments, where users could raise questions or make requests, saying, *"We have a section for comments... and occasionally, you know, somebody will see somebody else's comment, and then they will reply or provide a link to some document that someone is looking for."* Solutions like the comment section and open blog pages not only allowed users to request and curate specific materials but also facilitated exchanges and discussions among the users.

4.3 Supporting Non-dominant Forms of Knowledge Production

The construction of alternate or lost histories within archival work serves as a critical approach to challenging dominant narratives. This process is essential for centering the injustices experienced by communities that have been historically marginalized. By presenting narratives that diverge from mainstream institutional archives, the digital archives in this study sought to illuminate the lived experiences and knowledge systems of these communities, which have often been overlooked or suppressed.

We observed that the digital archive projects encountered knowledge conflicts when existing narratives and histories failed to adequately represent the experiences and identities of the marginalized communities they worked with. In response to this conflict, several projects focused on reconstructing lost histories and addressing silences by retelling their own stories. P7, a native of the community where their archive functions, stated that their community's *"history has always been written for."* They further explained:

> *"We felt the need to retell our own stories, we felt that existing forms of knowledge production... was not sufficient enough to tell our stories."*

P7 further discussed the importance of understanding the broader connections between specific regions within the Himalayas, such as Sikkim, Darjeeling, Nepal, and Bhutan, which are often overlooked or fragmented due to colonial and postcolonial border formations. Their digital archive project sought to reconstruct these interconnected histories, recognizing that *"in this so-called postcolonial space... borders have become so burdened"* that they obscure the shared histories and cultural ties across the larger Himalayan region.

One of the key challenges in constructing these alternate histories is the recognition and validation of knowledge that deviates from established hierarchies. For example, in P10's digital archive project, the effort to position *"farmers as professors"*—and thus as holders of valuable knowledge was met with resistance from national government agencies. The agencies were uncomfortable with narratives that disrupted the caste hierarchy, particularly when these narratives recognized the expertise of Dalits, a term used for untouchables, indigenous individuals, and others outside the Hindu caste system. P10 elaborated on the issue:

> *"The fundamental challenge that we faced ... is saying that farmers are professors, like we made these bold big claims, right. And the government, the national government, the government agencies that control national parks, they were very upset with these narratives, as there's a caste hierarchy, right. And so [X] is Dalit, and every single person in our community is also indigenous. And so I think for us, fundamentally saying that this knowledge is relevant is also important."*

The quote above highlights the conflict that arises when alternate histories confront dominant power structures. We found that by asserting that the knowledge of marginalized communities is significant, digital archives projects attempted to take up a transformative role in challenging and reshaping historical discourse. The act of recognizing and prioritizing these alternative forms of knowledge not only validated the experiences of marginalized communities but also disrupted the exclusionary practices of dominant narratives.

Furthermore, the methods used to collect data for these digital archives are themselves a form of resistance against conventional colonial methodologies. Engaged and community-centric methods such as photo elicitation and oral histories were used to empower communities to tell their stories in their own words. These methods prioritize the voices and perspectives of those who have been historically excluded from the archival process, aiming to democratize the (re)construction of history. P3 explained their process of listening to stories with community members:

> *"So the methodology of going to reach out to people listening, is called Photo elicitation. So you ask for their narrative by picking a picture and then asking about it. And the narrative, the oral history kind of unfolds from that photo itself. That and also... like as an archivist, you always have the choice, you have a lot of power of who to include in a feminist archive and who not to include, but not just who, but what kind of photos to include in an archive. Most of the pictures are from people's personal albums. So out of the personal albums, what do we make public? So that's like a decision that one needs to constantly grapple with, which I learned while doing it."*

The quote above also speaks of the ethical considerations and power dynamics inherent in archival work. The community archivist's role is not merely to collect and preserve but to engage in a critical decision-making process about the boundaries of who is part of the community, whose histories are told, and how they are represented. The selection of photographs and narratives from personal albums, for instance, involved navigating the delicate balance between private memory and public history. By carefully curating these materials, members of the archive projects attempted to ensure that the archive reflected the diversity and complexity of the community.

Several interviewees discussed how they adopted a reflexive stance to navigate knowledge conflicts in the (re)production of historical narratives. P8 described how their scholarly training initially limited their research approach, as they relied on *"mainland literature, mainland sources, and archives"* that failed to provide the materials and narratives they sought. Recognizing that they were *"looking in the wrong direction,"* (P8) several participants acknowledged the limitations of conventional academic and archival methods. This recognition prompted a shift toward alternative sources and methodologies that enabled them to document overlooked histories and challenge dominant knowledge production frameworks and institutions.

4.4 Activating the Archive towards Social Injustices

The structures of the archive projects designed and managed by the participants varied from websites that contained archived historical collections to more active projects that were constantly finding ways to contextualize socio-historical injustices with present conditions. By preserving the past and creating spaces where archived information could be recontextualized towards justice and advocacy, the digital archives navigated knowledge conflicts and actively engaged in liberatory memory work [14].

Several digital archive projects employed liberatory approaches such as organizing the public around shared concerns by reinterpreting and contextualizing historical materials and narratives with present-day realities. P8, who had been interested in finding ways to activate photographs and visual mediums to retell histories of marginalized communities in Nepal, highlighted this approach, stating:

> *"I think I've had to think about the archival work in a very different way… doing history work in this very sort of exhibition diary, as well as in the context of public memory and preparing work for the public directly."*

This shift from traditional archival methods to a more publics-oriented approach, emphasizing community engagement around shared concerns, was particularly evident in one of their projects, which focused on anti-caste movements in the region. P8 explained that this project *"gave us here a kind of a methodology for looking at photographs to tell and share histories."* They further stated that it was about *"ways you can sort of interpret photographs, as well as center different kinds of subjects through photographs."* By curating these photographic archives with an eye toward public engagement, the archive projects were attempting to bring historical injustices to light in a way that resonated with contemporary struggles for justice.

Indeed, scholars have argued that utilizing active and liberatory forms of memory can be useful in situating reflexivity and self-critique within social, cultural,and political activism [14, 37]. Here, traditional archiving approaches that emphasize "professional advocacy of neutrality and passivity" are rejected in favor of an active recordkeeper who "participates in the creation, management, and pluralization of archives and seeks to understand and guide the impact of that active role" [37]. This perspective was reflected in the statements of P7, who remarked, *"I as a sort of an archivist or a curator, perhaps am more interested in a much deeper conversation about justice and law. And I think that requires… a deeper thinking about both time… and what is impinging on the present in some ways? And what are the sort of matters of the present, which are tied to these questions about justice and dignity, as well as equality."*

Supporting the idea of a liberatory and active archive was also discussed by interviewees in terms of community ownership and speculative practices. For example, P2 emphasized the need for archive platforms *"rooted in ethics of care, social justice, and collective agency."* P2 further articulated their digital archive as *"an alternative platform built on ethics of care, social justice, and collective agency that enables communities to continually archive, create, remix, and engage their own tangible and intangible heritage knowledge systems and memory projects."* As per them, this approach preserves cultural narratives and ensures that communities maintain ownership of their heritage while providing ethical avenues for sourcing stories for entertainment industries like film and gaming. P10 highlighted the speculative aspect, questioning how future technologies could *"reactivate the village temple as a living co-created archive,"* seeing these spaces as sites that *"live with memory"* and could provide novel engagements with ancestral knowledge and heritage.

Digital archives, as pointed out by some interviewees, also offered opportunities to amplify voices traditionally excluded from policymaking processes. By documenting and sharing lived experiences, several archive projects included pathways for social change. Such initiatives embraced advocacy for policy changes through collaboration with various groups, effectively combining art and storytelling with activism to drive systemic transformation.

One particular initiative, which P7's digital archive was working on, focused on domestic and migrant workers in Sikkim, a state in the Indian Himalayan region. In this project, they were working closely with migrant and female workers to create visual stories. These stories were then integrated into a *"policy-centric framework"*

(P7) to demonstrate how art can serve as a medium for activism and influence policy. P7 elaborated on the goals of this project:

> *"The larger identity agenda towards the end was how can art act as a space of activism and also interventions in terms of policies, like, you know, how can it bring about changes?"*

Another digital archive, structured as a collective, also took an approach to activism at the intersection of art and policy (P8). Here, P8 highlighted the importance of using storytelling to make powerful interventions and collaboration with non-profits and activists to develop an archival project. They were inspired by larger movements like the Dalit movement that have historically employed art in activism. They noted:

> *"[Archival work] does open up a space for this kind of activism... which is where we are learning from as the collective as well. Where [we try to understand] how we will get the Dalit movement involved, or other marginalized movement, as they have always been using art as a medium to make very powerful interventions through these spaces. I think the Dalit work, we've worked very closely with the NGOs [Non-governmental organizations] here, and Dalit activists who took a very, like, important role in designing of the archival project itself, and the narrative building in terms of you know, what kind of things to need to be archived to integrate something like a Dalit history here."*

To effectively organize public interest and advocacy efforts around community concerns, the digital archives recognized the importance of participatory, longitudinal, and adaptable approaches to ensure engagement with evolving cultural and social narratives. However, this also introduced challenges, such as conflicting interpretations and the need for continuous resource allocation to maintain the archive's relevance. We found that the tension between liberatory and passive practices in digital archives is not a technical or procedural issue but a fundamental aspect of how and why knowledge is preserved, (re)contested, and utilized. By adopting liberatory archival practices, the archive projects were not merely preserving the past but were continuously evolving so as to effectively engage with the present and future.

5 Discussion

5.1 Surfacing Conflicts to Uncover Design Spaces in Archival Projects

Our findings revealed that digital archive projects used participatory techniques to identify and address knowledge conflicts, ensuring their initiatives remained accessible and relevant to Himalayan communities. By doing so, the digital archives created arenas to address ongoing and unresolved epistemic and socio-environmental injustices in the Himalayan region. The projects utilized oral histories, storytelling, and photo elicitation with marginalized communities to generate public interest over shared concerns through exhibitions, workshops, films, art, and advocacy efforts. Our study showcases that knowledge conflicts, particularly those involving marginalized groups, are useful sites for design interventions. The archive projects produced agonistic spaces that expressed diverging views and countered hegemonic narratives through participatory assemblages [6]. Scholars have argued that conflicting and incompatible historical narratives can be useful for understanding the "local contingencies in which sociotechnical decisions are made" and undoing past mistakes by designing alternative practices and arrangements [70]. In terms of digital archives and other computing practices [66], particularly in regions similar to the Himalayas that have been deeply shaped by colonial influences, agonistic participatory interventions can be critical to addressing knowledge conflicts and epistemic injustice. In a similar manner, we observed how interviewees resisted and made efforts to shift away from colonial archival practices towards approaches that embraced conflicts with dominant and existing narratives through collective and participatory approaches.

Sustaining the archive by opening the projects to wider groups requires not just scaling the number of active contributors but empowering community members with the tools to collaborate and navigate conflicts [36]. This means enabling practices that allow for the coordination of individuals beyond the curators, designers, and developers of the archive project to community members and other individuals who are interested in participating. Here, we suggest a turn towards conceptualizing and designing digital archives as dynamic and collaborative online communities rather than passive and centralized digital collections, wherein discussions over their maintenance, impact, and archival practices must be continuously revisited. Critical archival studies scholars have cautioned against passive records that assume a *clean break* from past and ongoing conflicts [14]. For example, the digital archives in this study implemented technological solutions and tools such as comment boards, peer-review processes, open blog pages, and content submission forms to open up the digital archives for collaboration and cooperation with individuals. We posit that digital archive projects can further draw together HCI research on intangible cultural heritage platforms [44, 74] and online communities [17, 42, 52] to pave pathways and design interventions that allow for archive projects to be more inclusive to "non-professional" contributors by supporting arenas where negotiations, debate, and collaboration can occur. To do so in the context of region-specific digital archives, will likely require unique localized approaches that are more apt for small online communities [49], as the digital archive projects involved in our study were much smaller than institutional cultural heritage initiatives or peer-production communities like Wikipedia.

The digital archives in this study used tactics to extend their impact and purpose beyond mere digital collections to active players in broader policies governing the Himalayan communities. We found that digital archives that were designed and prefigured in ways that incorporated practices of cooperation, conflict, and collaboration with communities were better situated to address policies, laws, and historical subjugations that had placed the communities in marginalized situations. Design scholars have argued for embracing policy throughout the design cycle as a way to navigate conflicts between communities and stakeholders, collaborate on critical governance decisions, and create a holistic understanding of how policies may impact the functioning and goals of a system [50]. As such, the collaborative work that goes into designing and sustaining the digital archives has direct implications on the meso-level policies, which dictate how such platforms negotiate internal

conflicts that arise when deciding on what is digitized, what technical systems are used, who is involved, and who is left out as well as the macro-level policies that create external conflicts in terms of what knowledge is oppressed, what actions can be taken towards social and epistemic injustices, and what collaborations need to be fostered. We observed that, to effectively address these issues, designers of the digital archives needed to remain actively engaged with communities in order to foster productive adversarial engagements by creating spaces for policy change [27], building public support for advocacy, and strengthening relationships between policy actors and communities [75].

5.2 Towards Designing Digital Archives as Digital Commons

The tactics employed by the digital archive projects aimed to create inclusive environments and practices for the communities to pool resources for sustaining and maintaining the projects. While several projects employed activities such as volunteer programs and archival workshops as ways to foster engagement with their projects, all participants stated that ensuring that the digital archive projects continued to exist and were relevant to the communities was a constant challenge. Resource needs such as costs of maintaining technical infrastructure, labor, and data storage created further burdens upon the archive projects. In response to these obstacles, we noticed practices of using open-access platforms, open-source software, and training local community members on how to navigate the technical infrastructure and curate the archive. These steps, along with other activities such as creating inclusive spaces for communities to share their stories, life experiences, and collaborations across organizations, institutions, and communities to foster solidarity allowed several digital archives to move away from a techno-centric and preservation models of the archive towards a notion of a digital commons archive that is collectively managed and governed. These tactics, as we argue, can be advanced if digital archives are conceptualized and designed by drawing upon approaches used by commons scholars, such as the concept of commoning [47, 55, 63].

We draw from theories of commoning, i.e., ongoing practices that allow for the collective (re)use, reclamation, and governance of the commons [43, 55], as a way for digital archives to ensure sustained engagement and, importantly, to empower community-led action in socio-environmental issues and epistemic injustices faced by communities [34, 63]. Similar to Christen's conceptualization of *slow archives* [21], we found that participants who took up the responsibilities as liberatory memory workers [14] diverted attention upon purposeful and engaged relationships, built with communities over time on a foundation of connection and care instead of the products of the archives, such as the metadata and collections, as a means to reconfigure archival norms of ownership, access, stewardship, and circulation. In a similar manner, commoning scholars have also noted that "political communities of commoning emerge through socionatural subjectification and affective relations" [63]. The archive projects used oral histories, community exhibitions, photo elicitation, and storytelling groups to draw out peoples relations with each other, their ancestral practices and culture, and their lived environment as ways to tune into these socio-natural subjectifications and affective relations and ultimately (re)produce culture in commons. These practices aided in strengthening an identity formed through shared concerns through affective subjectivities, which commoning and design theorists have posited as a necessary element of world-making practices that create collective subjects motivated against the extractive and exclusionary capitalist relations impacting their environment [40, 63, 68].

In order to design a digital commons archive that supports commoning practices, it is essential that we pay attention to the *processual* nature of archival work. Commoning as an ongoing and relational process places emphasis on the ways that communities are constituted [43]. Several digital archives facilitated a series of smaller events regularly to have people contribute to the archives, foster debate about their collective memory, and maintain an ongoing dialogue in terms of what it is that they are trying to do. Designers have advocated for commons-based arrangements within memory institutions, such as these archives, using an infrastructuring lens to highlight the *gateways* that can connect the commons with ongoing practices [59]. Turning our gaze to the relational and ongoing social and technical characteristics prevalent in the design and maintenance of the archives can be useful in avoiding the paralysis caused "by preservation, celebration, and protection of the past" [60]. By doing so, we are provided with opportunities to nourish the living, continuous, and emergent nature of the archive through participatory entanglements [71], equitable access to the resources, and alternative community-centric arrangements that have long been advocated by commoning theorists.

From our findings, a crucial barrier to designing archives as digital commons-based infrastructure remains the issue of *open and free access* to the cultural resources and *self-governance* of the archives. Digitizing cultural resources and making them available online, even for free, poses challenges such as selection biases in what is digitized and hosted, the application of western metadata schemas to incompatible cultural resources, making resources accessible online that may not be usable by the originating communities, and hosting culturally sensitive information that communities cannot dispute [19, 57]. These challenges suggest that digital archives move beyond the goal of making information open and freely accessible to a more careful attention to the "orchestration and alignment of motivations, practices, and tools" [59]. Relatedly, approaches within liberatory memory work that deprioritize open access in favor of "culturally appropriate protocols for the treatment of sensitive materials" from marginalized communities may offer useful guidance [14]. For example, the Mukurtu project shows how a grassroots approach to a digital archiving project can enable accessibility in a democratic manner towards Indigenous sovereignty and decolonization of the archives, wherein sharing of knowledge is tethered to solidarity efforts and addressing epistemic erasures [20, 22].

The digital archive projects in this study also attempted to bridge the gap between community concerns and the usage of open-source technologies and public domain infrastructures by implementing approaches of shared stewardship and community authorship. Scholars have called for this post-custodial model, where open access is debated and enclosures are opposed, by de-centering the role of the archivist [46, 67, 73]. Post-custodial models can create assemblages with community-led governance of a digital commons archive through approaches such as peer monitoring, graduated

sanctions, and by relationalizing property so that communities can make custodial decisions based on collective interests and on-the-ground realities [9]. Designing a digital archive as a commons, as a means for communities to oppose social and epistemic injustices, then entails distributing the model of the archive as a heterarchy wherein participants can engage in peer governance through collaboration, cooperation, and care in order to reach consensus in decision-making processes and conflicts that emerge during archival work [7, 34].

6 Conclusion

Caswell argues that archives are primarily a means for supporting and enacting political action in the present [14]. Creating public arenas and designing tools that can support entanglements that can surface and negotiate conflicts is a critical aspect of archival projects towards making visible the enclosures and oppressions that hinder the democratic production of knowledge and designing pathways through which "minoritized communities can coalesce around reinterpretations of records activated during reoccurring moments of oppression [14, p.114]." In designing digital archives as a digital commons, these initiatives have the flexibility to configure themselves as active mediators of conflicts, community issues and needs, and collaboration by distributing responsibilities of governance, curation, and authorship. As such, digital archives have the potential to be active participants in addressing ongoing socio-environmental and epistemic injustices that mire marginalized, ecologically sensitive, and culturally diverse regions. Furthermore, digital archives can then better support their existing strategies and uncover new ways to create meaningful impact through advocacy and collective action. While we found several digital archive projects that are already experimenting with conflict management and commons approaches, there are insights and arguments from HCI and CSCW scholarship that these and other archival projects can draw upon to further enable democratic arrangements and participatory archival practices.

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