

Clash of Times: Respectful Technology Space for Integrating Community Stories in Intangible Exhibits

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ABSTRACT

Emerging research in Human Computer Interaction (HCI) has considered the use of technology to preserve Intangible Cultural Heritage (ICH) while wrestling with the dilemma of local participation in the face of post-colonialism. There remains a need to understand how ICH is portrayed by museums and texts, how communities regard these representations, and how technology would affect preservation. We conducted a study in the North Rift region of Kenya to understand how ICH is preserved and disseminated by the museum in comparison with the community. The findings describe a respectful technology space where community needs and museum needs can co-exist. We also articulate social challenges that should be considered by designers when recommending or designing technological solutions. This paper concludes by recommending ways for researchers to smoothly integrate technology with ICH through community participation and an awareness of the respectful space.

Author Keywords

Intangible Cultural Heritage; Post-colonial Computing; HCI4D; Indigenous Knowledge; Respectful Technology

CCS Concepts

•**Human-centered computing** → *Empirical studies in HCI; User studies*; •**Social and professional topics** → *Cultural characteristics*;

INTRODUCTION

Research on the intersection of Human Computer Interaction (HCI) and Intangible Cultural Heritage (ICH) has considered means of responsible preservation of ICH, and wrestled with the dilemma of appropriate local participation in the face of post-colonialism. ICH studies cultural traditions and practices such as craftsmanship [33] and enfold as a subset, indigenous

Knowledge (IK)—the practice of how oral narratives are “retained and refined” [2], e.g., regarding unique language use and spiritual beliefs [2]. There exists a large unexplored area at this intersection raising questions about how ICH is portrayed by museum and texts, how communities regard these representations, how technology would affect the preservation of ICH, and the *respectful technology space* where all can co-exist. In Kenya, as with a majority of other African countries [26], most museums are governed, staffed, and funded by the central government, under the National Museums of Kenya (NMK) umbrella. The museums’ mandates are twofold: to represent the communities that surround them, and to promote cultural tourism to both the locals and outside visitors.

To better understand museum-community relationships and to investigate the role of technology and the people’s attitude toward these technology in conveying and preserving ICH, we conducted interviews with 11 participants. They comprised three museum docents, and eight community members that included four cultural experts in the North-Rift region of Kenya. We explored how museums curated, displayed, and explained artifacts, and the docents’ understanding of the showcased exhibits. We also explored the sentiments of the community members regarding whether they thought their culture was properly represented as part of a larger discussion about colonial-local conflict [46]. We further probed for the current role of technologies with addressing the needs of these groups and what challenges can be addressed with new technologies.

Our work builds upon previous research addressing challenges of technology use in rural areas [4, 40, 27], and that applies technological approaches to preserving intangible cultural exhibits [2, 26]. We do so by highlighting the differences between what the museum presents about the culture in contrast with what members of the culture present about themselves. While the museum holds the cultural artifacts and tells some of the stories provided by these artifacts, the story presented is incomplete and sometimes decontextualized [60]. The languages used to represent these stories also vary, but are similar in the essence that they were presented in the form of a third-person narrative, stripping the “language and identity” from the narrative [1]. This is compounded by the nature of intangible heritage itself, requiring “performance” and specific language [3]. We extend the research by describing a

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respectful technology space where technology can co-exist with culture which we argue, is a step towards mitigating the effects of presentation and language.

We make three major contributions for the HCI community with this study: First, we deepen the Human Computer Interaction for Development (HCI4D) understanding of how formal museums select, display and convey intangible stories in comparison with traditional ways. Second, we give detail and context in the way ICH is represented both within and without communities, and the post-colonial tensions that emerge from these dual representations. Finally we define and describe a *respectful technology space* typology that aids in the navigation of the design space that straddles the use of technology in ICH and the role of the community, highlighting opportunities and challenges to be navigated when designing, creating and/or deploying technology to support cultural preservation.

RELATED WORK

Our study is at the cross-section of cultural heritage and technology. We consider how indigenous knowledge (IK) (a subset of intangible cultural heritage (ICH)) is preserved, the role that Human Computer Interaction for Development (HCI4D) has played in their representation and preservation, and the tensions that emerge at the confluence of traditional cultures and technology.

Indigenous Knowledge and Postcolonial Computing

Indigenous Knowledge (IK) focuses on the passage of information from one generation to the next, typically in the form of oral narratives and performances. This, to facilitate inter-generational communication, which is the “continual preservation of the values and traditions of a society” [8] “from generation to generation” [57]. Examples of inter-generational communication include the use of fables to reinforce community, courtesy and justice, and also to provide a means of enunciating social systems: beliefs, actions and codes of behavior [8]. There is an acknowledged need for a better understanding and a careful navigation towards the use of technology to preserve indigenous knowledge: the UNESCO 2003 convention [56] provided guidance for safeguarding of ICH that involve both the “masterpieces” (performance) and the “masters” (people) in “...supporting the conditions necessary for cultural reproduction” [25].

UNESCO’s guidelines also underscored community consent and participation in the safeguarding process—which typically involve some technology use [57]. The rise of postcolonial computing also follows those guidelines and emphasize the ethos of “designing from within” [18] in approaching IK with the understanding that design research should be “culturally located” [21], should understand collectivity and power dynamics [3], and should account for factors such as literacy [59] in how they affect the IK dissemination and consumption.

Important also to a postcolonial computing approach is the effect that researchers’ bias can have in constraining the negotiation of local meanings [60]. Recommendations towards approaching this design space call for techniques based on the “doing and saying” principle [3], and “...seek[ing] solutions that resolve local details without translating everything to the

global” [16]. From Bidwell [4], we glean the importance of not neglecting the rhythms of life when preserving ICH, and being conscious of the danger of imposing meanings, by understanding kinship and social relationship importance over education or work and balancing self and communal interest.

Other recommendations include: approaching the preservation of IK by respecting oral narratives and performances as they are used to reinforce social structures and mark different stages of growth and responsibility [4], resolve disputes and sanction behavior [8]. Our aim in this work is to understand the current state of indigenous knowledge and leverage our understanding on the postcolonial computing to better explain the respectful boundaries of technology applied to it.

Technology for Intangible Cultural Heritage Preservation

The nature of African ICH include performances and oratures that are abstract, complex, filled with metaphors and obscure formations [4], resulting in layered meanings. Previous studies have underscored the importance of defining terminologies associated with ICH so that it is broadened and extended to enfold heritage as an “act of communication and meaning making [...], an experience” [50]. They have also underscored the importance of encouraging and giving the “creators and bearers” (i.e. local community) a larger role to play in the process of defining heritage [7, 32], and the inclusion of tangible artifacts with ICH without commodifying the artifacts [6].

The acknowledged role of the *masters* – elders as cultural experts and repositories of cultural knowledge – and their responsibility to bequeath the knowledge to subsequent generations, is well supported [58]. Recognized also, is the need for careful consideration when using technology to preserve ICH in a manner that preserves its orality and originality, while also affording the space necessary for the ICH to “die” and/or evolve, by supporting cultural memories as the members “negotiate new ways of being and expressing identity” [50].

The performance nature of ICH has led to the emphasis on non-text methods to preserve cultural identity and to provide a continuity substitute [3]. For instance, video-mediated communication [2] has been used to facilitate cultural knowledge transfer [10] to fulfill local-driven needs to support inter-generation interactions in a manner that preserves old knowledge [51].

Technology has also played a role supporting preemptive attempts to preserve the oral histories and intangible cultural heritage before they are lost [33]. These approaches have spanned the use of interactive table-top displays [38] to showcase exhibits, the use of virtual reality to convey oral tales while also promoting interactivity [49], and the use of mobile technology in the documentation of ICH for preservation [45]. We build upon these previous works by first querying the current use of technology in the preservation of intangible cultural heritage in Kenyan museums, the types of IK the museums convey, the involvement of elders as cultural experts, and discussing the design space for the role of technology in both preserving and conveying ICH.

ID	Gender	Age Range	Interview Time	Notes	Location
M1	W	30 – 35	1hr	Museum Docent / Museum Curator	Tambach Museum
P4 †	W	55 – 60	2hrs + 45mins	Parent Generation	Various
P10	M	20 – 25	15min	Youth Generation	Tambach Town
P11	M	20 – 25	20min	Youth Generation	Tambach Museum/Town
M2	W	35 – 40	25min	Museum Docent	Kabarnet Museum
P7*	W	90 – 95	3hrs	Grandparent Generation / Cultural Expert	Kabarnet Town
M3	M	40 – 45	45min	Museum Docent	Kitale Museum
P5 †	M	65 – 70	30 + 30 Mins	Parent Generation	Kitale Museum
P8*	M	85 – 90	1.5hrs	Grandparent Generation / Cultural Expert	Kitale Region
P9*	W	85 – 90	1hr	Grandparent Generation / Cultural Expert	Kitale Region
P6 †	M	60 – 65	1hr + 20min	Parent Generation / Cultural Expert	Eldoret Region

Table 1. Participant data: Community participants (P) and Museum Curators/Docents (M). The ages of participants with P* notation are approximate because of participant uncertainty with their year of birth. We conducted follow-up phone interviews with Participants with P† notation to clarify responses, answer further questions and to check the accuracy of the transcriptions from expert interviews.

Technology-Cultural Tensions

With the movement towards IK preservation, there is tension that arise between the need to preserve the knowledge, and the contentious role of technology in preserving these ICH for posterity. Oral history is perceived to be resilient against time, having survived throughout history “without the help of cultural policy” [25]. The benefits of technology in preserving ICH and IK are known, and it is established to be non-trivial [47]. However, considering the cultural sensitivity that is the hallmark of postcolonial computing, there remains a tension between technology use in the preservation of intangible cultural exhibits [49].

Oral narratives are also ordered differently—following human relationships rather than seasons/time [4], conflicting with various aspects of the modern life currently used in the preservation of IK. The use of Western/Roman chronology to narrate times [35] sometimes conflicts with the traditional means of associating history and stories with people, and this polychronic time-keeping has led to interruption of cultural rhythms [20], and tensions between what is culturally faithful and what is an influence of the colonial times [53, 60]. The role of the “preservers” in this, is also a cause of tension [17].

Technology and the impact it has on communal ties is important. While codifying these in ICH is a known approach towards safeguarding it [49], sometimes this conflicts with a community’s needs and interest in keeping the narration unwritten—since the solemnity of passing the oral narrative is an integral part of the IK. The use of technology to then preserve this knowledge fundamentally is in opposition to these types of IK and the application of it would remove the “heart” from the orality in indigenous knowledge [17]. Oral history it is argued [25], is supposed to be oral for a reason, and removing the “heart” and only showcasing “what was wiped out” in the community [25] goes against the ethos of IK.

While there is a need to preserve and pass on indigenous knowledge, especially to diaspora generation [2] and to bridge the “skip generation” [4], at the same time there is an acknowledged role of technology in amplifying power/access inequality between urban and rural areas [54, 61]. Digital democracy has also conflicted with communal ties that under-

pin IK [4], and interrupted knowledge stewardship—the flow of information and how it is traditionally passed from generation to generation [9]. Our approach to mitigate this conflict incorporates Christen’s [14] use of elders in determining access control to information that is preserved using technology. It is in this domain that we situate our research, by understanding first the communal ties, the current use of technology and where it fundamentally conflicts with the preservation and dissemination of IK. We describe this as the *respectful technology space* and it informs our understanding of the appropriate boundaries around technology use in preserving ICH.

STUDY METHODOLOGY

To understand the perspectives on how IK is narrated from both the cultural experts (elders) in contrast to the “official” state-sanctioned museum narrative [50], we conducted an interview-based study with museum docents and curators, cultural experts, and community members in an effort to specifically (1) identify similarities and conflict between IK as narrated by the cultural experts, in comparison with the museums that represent them; (2) understand the current state-of-the-art of intangible cultural exhibits, and how this manifests in a typical cultural museum in Kenya; and (3) gather insights that would inform the design of a *respectful technology space* that future technologies can use to support both the museum and the communities it serves, in best preserving their heritage.

Study Site and Participants

This work draws on interviews with 11 participants who had different familiarity with oral histories and cultural information, and spanned different generations: three museum docents and eight community members, four of whom were considered cultural experts. The community members comprised different age sets, and possessed different cultural knowledge transferred to them by various means (Table 1).

The interviews were conducted across four towns in the North Rift region of Kenya, an area which encompasses Turkana, West Pokot, Baringo, Elgeiyo Marakwet, Trans-Nzoia and Uasin Gishu counties, and is predominantly inhabited by the Kalenjin and the Turkana communities. We conducted interviews in Tambach, Kabarnet, Kitale and Eldoret based on their proximity to all the three museums (Tambach, Kabarnet and

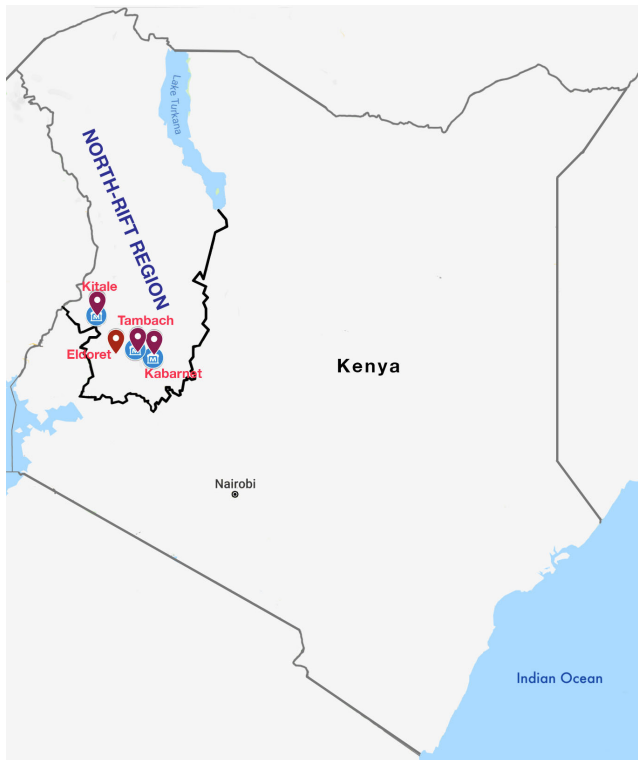


Figure 1. Study Sites within the North-Rift region of Kenya

Kitale museums) in the region that are part of the National Museums of Kenya and serve to represent the surrounding communities (Figure 1).

Kabarnet and Tambach museums serve to represent the Kalenjin community, while the Kitale Museum focuses predominantly on the Kalenjin and the Turkana, with less representation of the Luhya community who also inhabit the surrounding Trans-Nzoia region. The research group comprised of three women and three men all who work in the HCI domain focusing on various aspects of rural computing. The first author was born and raised in the study region and maintains ties with the community. Those ties facilitated the interview opportunities especially with the local cultural experts.

We had some participants (P4, P5 and P11) accompany us on our museum visit, and after the docent-led tour and docent/curator interviews, we interviewed the accompanying participants on their added input, experience, and their attitudes about the provenance of museum-provided IK. After the museum visits, we conducted wide-ranging interviews with cultural experts (P7, P8 and P9). These participants are part of the oldest generation in their respective communities, with the knowledge repository of IK. We interviewed the cultural experts in their homes and sought to understand, beyond the content of IK, the process of bequeathing the knowledge and the boundaries of what should be passed along, and the responsibility of selecting whom to pass the IK to. Being the repository of communal knowledge, and being compelling storytellers, neighbors and other surrounding community members were often aware of the scheduled interviews and were interested

in listening in to the cultural experts' narratives. We had an audience of between five people for the interview with P6 and 12 people for the interview with P7. We interviewed the cultural experts iteratively, leveraging their collective memory (often with interjections from the assembled audience), until we arrived at a theoretical saturation. It was also important for contextual reasons to ensure that we had voices across generations.

To provide further cultural context, P7, P8 and P9 – the cultural experts who understand the IK nuances [52] – are considered to belong in the *grandparent* generation: born in the 1920s and 1930s and whose own grandparent generation experienced a time before Kenya was colonized by the British. This is the last generation whose oral histories and cultural know-how involve direct exposure to culture before colonialism. They are considered cultural experts because they are the go-to people to ask about events in their community history. Technology use for the participants in the grandparent generation mostly involved phones (limited to voice calls and M-Pesa [36] money services), and active listening of community radio stations such as *Kass FM* that broadcast in their dialect.

The *parent* generation (P4, P5, P6) were born in the late 1950s and early 1960s around the time of Kenyan independence from the British in 1963. This generation on-wards were formally educated and employed in towns and cities beyond their home region. They can be considered as peripheral technology users: technology is not main part of their their day-to-day life, yet they understand its benefit and they use it to augment their tasks as needed [40]. While none of the parent generation participants in this work owned a laptop, P4 and P6 owned smartphones that they used to check news events, update social media, access messaging services (especially WhatsApp ¹) and for other custom application uses such as hymn books and M-Pesa mobile service. P4 also listened to Kass FM community radio as a live stream, but only when on free WiFi. We found this generation to rely upon the grandparent generation to confirm IK details, further highlighting the importance of the grandparent generation as community record keepers.

The *youth* generation (P10, P11) – the children of the parent generation – are considered to be tech-savvy [36]. They tend to own both mobile phones and personal computers. Example use of technology by these participants included online betting and streaming live TV on their devices. We also found that they tended to actively look up answers to questions on cultural practices online. This is a stark contrast with the parent generation's reliance on the grandparent generation to provide these details. P10 and P11 had completed the rites of passage and were considered to be adults in their respective communities who can fully participate in community decision making.

All interviews with participants were conducted in person by the first author and audio recorded with permission. We also took photographs, especially of the museum artifacts discussed during the interviews with the three museum docents/curators (M1, M2 and M3), and we kept notes of both the interview

¹ <https://www.whatsapp.com/>

responses and our observations. M1 acted both as a curator and a docent, with decision-making capability of what can be displayed in their museum. M2 was less involved in their museum, although they could request artifacts from the NMK as needed. Kitale museum had a resident curator, therefore M3's role was solely docent-related.

In keeping with cultural sensitivities and participants wishes, especially when it came to discussion of matters that were considered sacred, we only transcribed parts of interviews with P7, P8 and P9; the rest were transcribed in their entirety. While the rest of the participants communicated in a mix of Kiswahili and English, the cultural experts communicated almost entirely in the Kalenjin language using various sub-dialects. The Kalenjin language is rich in metaphors, so we were careful to ask for clarifications during the interviews about statements when we felt we did not understand their dual meaning. Sometimes the participants would elaborate, at other times they would not, in keeping with the spirit of the metaphors. During follow-up interviews conducted over the phone with select participants, we checked our translations with P4 and P6 who had deep contextual knowledge of the language to ensure that the translations were faithful to the meaning conveyed in the original language.

Analysis

We performed thematic analysis [30] of the written corpus consisting of the observation notes and the interview transcripts. All the six authors first applied independent open coding to the corpus to categorize participant responses. The first author then extracted themes from this first exercise and then led a second group exercise using axial coding on the themes to elicit consensus meanings.

High level categories from the second exercise spanned cultural practices (expression or communication of beliefs and traditions), indigenous artifacts, the collective way of life (culture) and its expression. Categories also included historical events, landmarks, people and places. For each category, we considered (1) the current state and the IK surrounding it (comparing museum and community narratives); (2) the role and impact of technology (and colonialism) to the current version; and (3) the *respectful technology space* that current and future technology can occupy in preserving and/or showcasing them.

INDIGENOUS KNOWLEDGE CONTENT AND NARRATION

When considering ICH presented by the museums, we sought to understand their curation strategies, origin of the stories they shared, how provenance of these stories was done, and the role of technology use/non-use in preserving indigenous knowledge and cultural exhibits. The three museums we visited are managed by the larger National Museums of Kenya (NMK) and follow the general ethos of serving to preserve cultural heritage, providing a means for the “[community] to acquaint themselves with the cultural knowledge that is fast being eroded by western civilization” [5]. The layout, the choice of what exhibits to highlight and general curation choices are influenced by various factors: the resident curator (employed and dispatched by the NMK), the museum location, the NMK board of directors' vision [37] and political influence [31].

Kitale museum was also affected by other external events that influenced what artifacts were displayed and where. It had to adapt after having some original collections stolen [44] and as a result of urban encroachment [39] that affected the size of the museum grounds. Therefore, the tour of external grounds that was impacted by the encroachment had to be cut short.

Museum Outreach in Artifact Collection

The source of artifacts for the museums were impacted by their umbrella nature. Requests for upkeep resources and new artifacts are made from the local to the National HQ collection instead of the query being sent to the surrounding community.

“[The artifacts] is [part of] a collection. There are people who go to collection to look for those things.” (M2)

If the artifacts could not be found in the “collection”, the NMK sometimes utilizes cultural officers [19] to source the materials on behalf of the national museums, typically compensating the artifact owners. The museums also sometimes rely upon chance opportunities from visitors to the museum:

“We go out in search of the [artifacts] if we have a specific one in mind. Or someone would give as a donation after having visited us and they have artifact that is not useful anymore and want to help us showcase it in the museum.” (M1)

Given the unreliability of existing technologies, and also following laid-out protocols, the communication between regional museums and the Nairobi HQ are done via snail mail.

“It takes a while, but we see improvements now ... every time we write them letters to pressure them a little bit. We actually didn't have a sign-post but we now have one because the maps were incorrect.” (M1)

After the artifacts are obtained, the museum curators would provide the name and brief descriptions of the cultural artifact. The docents would then draw upon their personal anecdotes from their own communities and include stories told to them by previous visitors to narrate them to subsequent visitors on their visits.

Indigenous Knowledge Museum Narration

The docents' approach in how they narrated IK colored the visitors' impressions. The oral histories and how it was conveyed remained important contextual information to the artifacts present. Docent's preconception about the visitors community, while useful to convey contextual information, sometimes assumed the visitors possess knowledge they do not actually have:

“I prefer M1's museum, because of the storytelling. M1 was not from the region, but she did a good job in telling the story. M2 here is also knowledgeable, but she assumes a lot, probably because she knows that we are from the same community.” (P5)

The docents respected the knowledge possessed by community members, especially of the parent and grandparent generation. They would often cede the narration to them to provide nuances about stories, or provide further information about the

artifacts beyond simple descriptions. This was a constant refrain throughout the three museum tours (“mother” is a term of respect when a member of the youth generation addresses a member of the parent generation, while “sister/brother” is an address between members of the same generation):

“Maybe mother here can help us with an explanation?
... You are the ones to teach me about this... This one, I would love to hear mother’s explanation of it.” (M1)

“... this belt is tied by a woman, and when she unties it, she ties it on her son who is going to war. It is a blessing, so that the boy will return safely from war I think that is how it is normally done in your community? My sister (addressing P4), can you confirm?” (M3)

The ceding of authority by docents, beyond effecting visitor participation, was also a signifier of how the docents viewed senior members of the community and revealed unsaid boundaries about information considered *public* knowledge. This informed our understanding of the *respectful space* that we present in Figure 2 where we situate concepts from other work in the domain to provide context on our design reasoning.

Technology Impact on Community Ties in IK Narration

Our introduction and connection with participants in this work relied heavily upon community ties. Technology helped with this, by facilitating the expression of cultural practices and oral history with community members. Phones especially were used as a tool of communication to supplement the far-reaching personal network. The participants we interviewed were recommended by other community members and they aided our introduction to them: P6 was interviewed on P8’s recommendation who was in-turn recommended by P4—the outreach from P4 to P8 and from P8 to P6 was done over the phone. This community structure is important to provide contextual information about events and to also act as a means of provenance for tracing the origin of stories. The personal touch facilitated by the introductions done by community members on our behalf was, and is important in the willingness of the community members not only in conveying IK, but also openly communicating the boundaries and restrictions of what can openly be shared, and what cannot.

Through these communications that are facilitated by the connection to community members, we are also able to better understand the effect of time and technology on culture and traditions. This is especially important when considering the value of traditions that are disappearing from use due to time, mass production, and/or decontextualized IK. As an example, the art of making fermented milk called *mursik*—a local staple, was considered crucial for community survival and also as a way of honoring the source of food. The practice of *mursik* making however is gradually being lost to technology that support mass production of sour milk. A gourd called *sotet* is a tangible artifact that is used to store and aid the fermentation of the milk alongside other processes. But the mass production of sour milk and the use of refrigerators have led to the slow erosion of the traditional way of fermenting milk and with it, the indigenous knowledge accompanying both the process of

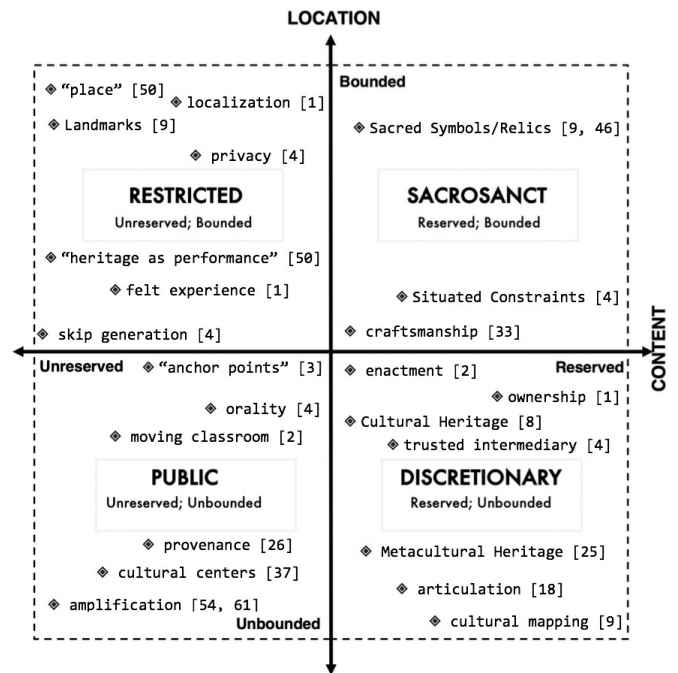


Figure 2. Proposed *Respectful Technology Space* typology for use in the preservation and dissemination of IK. We also positioned in the quadrants selected concepts from literature that are cited in this work; e.g., sacred symbols and relics are bounded but neither reserved nor unreserved, and landmarks are both bounded and unreserved.

mursik making and *sotet* crafting. P4 for example no longer actively used her *sotet* to make *mursik*.

“I still have my *sotet*, but they are in storage.” (P4)

The *sotet* was gifted to women during traditional marriage ceremonies as useful utensils, as a sign of welcome into another tier in the community, and as a nod to their importance as cultural anchors. The non-use of *sotet* with the passage of time and decontextualized IK has led to its likelihood as ornamentation: a sacred object turned into decoration. The *sotet* here is in a state of flux: unclear if its sacred use will completely disappear as the community negotiate new meanings [56], or if it is an example of a manifestation of a cultural dissonance [50] or cultural wicked problem [48].

ACCESS TO IK AND RESPECTFUL TECHNOLOGY SPACE

We desired to understand the origin of IK as narrated by both the museum and the community, particularly as to whether it was ancestral or colonial. The docents’ narratives when describing cultural artifacts were a mix of official museum narratives, personal anecdotes from their own communities, and stories told to them by previous visitors. They used both stories to augment the texts that accompanied each artifact displayed in the museum. From the community’s perspective, the parent generation have the benefit of a direct line to cultural information held by the grandparent generation. This was clear when interviewing P4, and P6.

I’m not sure, I think I need to ask my mother to know how or where they sourced copper [for ornaments]. My

Knowledge	Aspects of the IK Storytelling
<i>Disappearing Knowledge</i>	IK associated with artifacts that are no longer in general use
<i>Bequeathed Knowledge</i>	Contextual knowledge understood within the community
<i>New Knowledge</i>	Community knowledge recently gained through technology and time

Table 2. Aspects of IK Storytelling that emerged from the participant interviews. Understanding the impact of these aspects informed our approach to defining the *respectful technology space* typology.

grandmother used to wear them, but I don't know where they are now kept. (P4)

Three aspects of IK storytelling emerged from across the interviews with docents and cultural experts and that goes to inform our recommendation for respectful space (Table 2) : *Disappearing Knowledge*, *Bequeathed Knowledge* and *New Knowledge*.

Disappearing Knowledge is knowledge that is vanishing with the grandparent generation, for example the source of material for ornaments referred by P4 above, that was obtained through trade with the Swahili from the coast. *Bequeathed Knowledge* is what has already been passed down to successive generation. This includes cultures that the community still practices and also what visitors narrate to the museum docents who in-turn narrate it forwards. *New Knowledge* is knowledge that the community—especially the story-keepers are now learning: these knowledge contextualizes or challenges the knowledge they currently possess. We consider our findings regarding each of these aspects of storytelling and subsequently discuss the technology space and our recommendations.

Disappearing Knowledge

The museums showcased a lot of cultural artifacts that are no longer being regularly used. This served to underline the increased erosion of IK that accompanied such artifacts due to their non-use. Beyond the effect of time and technology, we find that the effect of colonialism and the infusion of politics, population increase and the resulting border erosion have contributed to IK's non-use and de-contextualization.

"Far neighbors knew each other by their villages ... You will have to ask the older folks about boundaries and name meanings but since today there are a lot of people, this way of recognition is dying off." (M1)

The NMK is in the process of incorporating the use of technology online ² and in the form of virtual museums to preserve original artifacts. These preservation efforts are however focused on biological specimens, with emphasis on paleontological exhibits [41, 43]. Beyond this, there was no overt use of technology in either conveying or receiving information for preservation either online or in any of the museums we visited.

Speaking to the elders and cultural experts and talking through these vanishing IK, we sought to understand the *respectful technology space* that technology can inhabit by first understanding what types of IK should be preserved. Two main

²<https://www.museums.or.ke/>

threads emerged: Cultural mores, for example the art of making *mursik* which, the experts were adamant should be preserved and *sacred* knowledge which should only be responsibly transferred to a chosen few. We review these separately in the discussion section.

The displayed artifacts in museums, while showcasing what was lost and what is in the process of being lost, were particularly useful in prompting participants to share IK associated with the artifacts, and consider seeking contextual information to questions that emerge:

"I don't know more [beyond the museum reference] about the rain ceremony. I think we need to visit [community elder] to ask these questions. He is still alive." (P4)

This prompting served to bring the older generations indirectly into the discussions about the artifact and the accompanying IK. There's no way for this information to be relayed back to the docent, except by revisiting the museum to narrate the findings.

Bequeathed/Contextual Knowledge

There is information that is considered common within a community but uncommon outside it. An example of such contextual knowledge includes the impact of the circumcision ceremony as a rite of passage from boyhood to adulthood and the naming of the new warrior age-set. This ceremony involves a process where *discretionary* community knowledge is bequeathed to the initiates who are placed in seclusion during this time [12]. The ceremony's importance to the community is understood [28], as is its role in sparking inter-community conflicts that mostly involves cattle rustling. However, the community possesses an innate knowledge that are typically underappreciated by being lumped together with other environmental factors [13] to explain the conflicts. The reason for inter-community conflict according to P6, is because the rite of passage leads to newly recognized men and the attendant permission to marry. In order to be able to afford the dowry price, the newly elevated men typically raid cattle from surrounding communities sparking the clashes.

"There will be peace in [West] Pokot for 13 more years... that is when the next ceremony will be held." (P6)

This innate knowledge depends on a deep understanding of cultural practices that are otherwise forbidden to be shared outside the seclusion context – we term these as *Restricted Knowledge* in our respectful technology space typology.

New Knowledge

With technology and the march of time, comes an understanding of harmful cultural practices that negatively impact the community and should be actively phased away. An example of a harmful culture is the practice of female genital mutilation (FGM) that because of technology and education, has been mostly phased out and made illegal [11]. The influence of technology is also evident in the transmission of contextual knowledge that lead to different cultural practices and/or new knowledge that contextualizes oral narratives. Radio programs presented in the local dialects offered by radio stations such as *Kass FM* have given credence to these new knowledge,

and provide valuable opportunities for elders from different communities to be privy to such knowledge and/or be involved in the discussions via call-in programs.

For the younger generations, web technology has bridged the gap towards providing answers to cultural questions. This is encouraged, especially with *public* knowledge. No permission from community is required to share information in the public sphere, for no sacred context/content is involved. Curation sites, online forums and more commonly, Facebook groups, currently serve to provide these supplemental knowledge.

“I know the Keiyo have all the (male) age-sets intact, but I always wanted to know why the Tugen and the Nandi don’t have it. I actually found the a bit of an answer in Wikipedia and then confirmed it with my dad.” (P10)

Contextual knowledge also emerged when discussing the effect of the World War II on the Kalenjin community and its culture when the authors were discussing the British recruitment practices with the cultural experts.

“We called it Borietab Talia (The Italian War) – the men selected from my village had to report to Tambach.” (P8)

P8 was referring to the recruitment of Kenyans into the King’s African Rifle [23] in early 1940s to stifle the Italian attacks. This served as beginning of Kenya’s involvement in World War II as a British colony [15]. P8 was interested in the larger context of the war: how the British colonialists managed to reach every village – the men selected to volunteer had to report to Tambach, which is a 2-day journey by foot. He was also interested to know why the British were fighting the Italians, and why on African soil? We were able to narrate some of the histories and provided contextual information both from the African and European perspective in our follow up, and offer new knowledge as a result.

CLASH OF TIMES

Considering the role of technology in first navigating the *respectful space* and then in preserving IK knowledge, we build upon previous work that navigated this dilemma with the consent and participation of Māori elders who were concerned in the preservation of sacred knowledge [9]. In our case however, the cultural experts were adamantly against the preservation of certain sacred/taboo knowledge. Even in the case of the sacred knowledge disappearing, P9 was adamant:

“If it disappears, so be it.” (P9)

This *Sacrosanct Space* (Figure 2) mostly involved sacred rites and rituals: prayers for rain and/or forgiveness that involved select elders from the community who had been individually chosen by the previous generations to be privy to these rites and knowledge, and the intimate details of the rites of passage that occurs in seclusion [12]. This *sacrosanct* knowledge space mirrors the exclusions that occur in real life:

“I wanted to attend the [sacred] prayers But the elder came and said no, I was not ready.” (P7)

Part of the sacredness, P7, P8 and P9 agreed, is also embedded in the solemn responsibility of bequeathing this information.

“Some knowledge should only be passed directly from one person to the next. Not written down, or [preserved] where [unauthorized] people can see it.” (P7)

Yet there was an awareness that there is a need for middle ground that navigates the *public vs sacrosanct* spectrum, to aid the continuity of IK transfer. This is especially important when considering the effect of migration and technology in disrupting the traditional way of passing IK:

“Even my children ask about these things, it is not just you... they need books about some of these things” (Audience at P7’s interview)

The reliance upon previous generation was also considered as problematic in cases where there was none available:

“P4 has the luxury of consulting her mother, I wish some of the things were recorded, so that when the elders are gone, we still have their stories.” (P5)

We next elaborate further on the narrative and goal conflicts, focusing on conflicts and differing goals.

Indigenous vs Colonial Narrative Conflict

The museum primary goal is in fostering cultural tourism. Kitale museum for instance, was founded by Hugh Stoneham during the colonial period, before being deeded to the country post-independence [42]. However, the layout and narrative of the current museum still reflects the colonial founder’s focus and narrative to this day.

“Stoneham, with his collaborated [colonial] group apart from the material culture that dealt with the communities, also had to address other areas of interest in [colonial] tourism.” (M3)

The continued use of colonial narrative puts the museum in conflict with the local community, especially when discussing the presence or absence of discussion about colonial impact on IK. The NMK, while talking about the colonial interconnection with the community, does not really explore the conflict and the still underlying tension and bitterness towards its deleterious effect on the local culture [24, 46]. This conflict has a spill over effect on technology associated with the colonial period – so sharing oral histories through technology is sometimes an anathema beyond what can be explained by understanding the *respectful technology space*. This leads to the belief that traditional culture is incompatible with modern technology: A clash of times.

“I was allowed to go to adult school for a while [during the colonial period], but I was told that I had to get rid of the traditional ornamentation that we wore. They were forbidden in the school. That’s when we all stopped ornamenting ourselves.” (P7)

The museums while discussing the use and history of IK, do not have any discussion or reflection on the colonial impact on IK – and what the community still feel a strong opposition to, or a demonstration that the museum has an existing support or connection to cultural experts.

Community and Museum Differing Goals

Beyond the narrative conflict, the museum representation of the communities was also affected by their target population who are mostly school children. Catering for this audience led to the preference on generics over individuality and authenticity. In Kitale museum for example, we noted that the vast majority of the artifacts were labeled with English names, the indigenous names were not included in any way. We asked M3 about this fact when discussing a traditional attire from the Turkana community.

[We use English names] because ... there is no Kiswahili word, because the original has not been translated to Kiswahili. The visitors [also] tend to be school kids. You see, because we are dealing with all levels of learners and ages, but when you go to Turkana – the name should be global to understand this [artifact]. We cannot focus on the Turkana alone. (M3)

The lack of connection is also revealed in the divergent approach towards cultural preservation. While the museum grounds provide ample space for cultural events, the community tends to hold them away from the museum with no collaboration. These community events and festivals such as the *Tugenin* [22] and *Koroto* festivals [34] are considered the highlight of the year by many [55] and serve as “a bridge between the past and the present... [for educating] children in the cultural values and the beauty of our people as we move towards modernity” [34]. To spread awareness to all the different generations, festival organizers utilize community ties in distributing by word-of-mouth, through local radio and TV stations such as *Kass FM* and *Kass TV* and via social media through Facebook communities and groups that focus on geographical heritage. P4 noted the underuse and missed opportunities:

“You need to advertise more. You should bring the Tugenin festival here too, to also to introduce more people in museum.” (P4)

Of the three museums we visited, only the Tambach museum solicited input from the community to inform both the museum collection and the museums relevance and longevity.

“We are collecting feedback because we have a vision of expanding the place. But we don’t want to do this on our own, we want to include the community and the visitors’ [input] so that at least when you next visit, there will be something new that you will get.” (M1)

The input solicitation is an early stage of creating community awareness and finding a space between nationally-led museum and community-led museums [24], that can serve both the NMK cultural tourism and the community’s cultural needs.

DISCUSSION

The goal of this work was to understand the state-of-the-art in ICH in how it manifests in museums and communities in Kenya, towards describing a respectful space that technology can inhabit in the preservation and dissemination of ICH. In this section, we situate our work in the previous research on postcolonial computing and HCI4D as we elaborate on

the concept of *respectful technology space*. From this, we propose three approaches that we argue designers and ICH researchers should analyze when considering technology for the preservation and dissemination of IK: effect of context and location on IK, the impact of colonialism, and the approach towards the application of respectful technology.

Location-Specific and Contextual Indigenous Knowledge

When considering site-specific ICH, our findings complement previous work that highlighted the opportunities and challenges of creating technology for the social space [40] and the IK preservation space [26]. We add to this corpus by considering the nuances of location impact on willingness to share IK: knowledge that can be shared only at specific location that we term as *bounded* while information that can be shared elsewhere is *unbounded*. This awareness of boundaries reveal a fundamental conflict in how the museums can highlight location-specific IK, and whether it is appropriate for the museum to be involved at all with *bounded* IK.

We also found that there is a great sense of responsibility and solemnity in the process of bequeathing IK, which reinforces the community’s sense of ownership of the narrative. The centralized decision making that is emblematic of the National Museums of Kenya structure while great at streamlining the museum message, it is at the expense of community participation, as it dilutes the message towards a general audience. This is also at the expense of promoting community investment and therefore a richer visitor experience.

Boundedness, beyond defining boundaries also explicitly considered are landmarks [9] and cultural places [50] that are considered either sacred or important for advancing, explaining, and placing the IK in perspective. The sacredness of the IK performance or cultural ceremony determines the quadrant placement in the *respectful technology space* typology: sacred ceremonies in sacred (bounded) spaces are considered *sacrosanct* while public performances in these places are considered *restricted*.

Colonial Animus and Trust

In this work we identify cases where colonial narrative [42] was still used to convey knowledge about ICH and how this knowledge has been exported without community permission [12]. This highlights the ongoing conflict regarding the repatriation of stolen sacred community artifacts [46]. The use of narratives that originated from colonial period and presenting it as a form of “consensus version of history” [50] sets the museums up for a conflict with the community as they wrestle with retaining ownership of IK.

From this study, we also find that the community is aware and narrate the impact that colonialism had on their way of life, a story that is missing from the museum narrative. While the docents respect and cede authority to cultural experts in narrating IK even during the museum visit, this is not reflected in how the cultural artifacts are displayed. We argue in this work that understanding permission boundaries in navigating what is *sacrosanct* vs what is *public* will ease the community-museum relationship.

Previous work has found technology to be an amplifier of inequality due to access differential of places, for example between rural and urban areas [61]. But intervention on the amplification theory calls for signal boosting “existing institutions that are already contributing to development goals” [54]. This aspiration guided our placement of this approach in the *public* quadrant due to the fact that these institutions could include cultural centers [37] and museums that are in the public sphere and that collaborate with the community it represents to responsibly disseminate culturally-sensitive indigenous knowledge [26].

Guidelines for Designing Respectful Technology

As a first step in navigating the sensitivities around knowledge preservation – what can be shared and how – we build upon previous research on cultural permissions [9], access matrix [29] and respectful design [48]. We then enfold them in our *respectful technology space* typology that is showcased in Figure 2. The fundamental consideration is in respecting the cultural boundaries on what can be shared (content), how (permission), where (location), and by whom (people).

Information considered both *reserved* and *bounded* encompass all the knowledge that the cultural experts considered *sacrosanct* and were not willing to have them preserved in any form other than through word of mouth that is conveyed in sacred locations, and as we found in this study, the solemnity of passing IK in this way is a fundamental part of the passage of this IK. We argue that technology should not be used at all in this space – this is in line with previous arguments that first consider the import of “masters” and also in respecting the longevity of ICH [25, 56].

Respectful technology should also respect the importance of situated storytelling: *Restricted* IK is simply bound by location and not in what can be shared, while *discretionary* IK can be shared at the discretion of the narrators – as was the case with how the cultural experts chose whether to explain metaphors. There is opportunity in both these spaces not only in the preservation, but also in the possibility of designers and researchers to work directly with the community and cultural experts in understanding the nuances of IK and negotiating preservation and the role of technology in it. The *public* space contains information that is unrestricted in how it can be shared and to/by whom. Here lies the responsibility to highlight public information that is considered important by the community, such as effect of stolen artifacts [46] and the impact of colonialism on the erosion of traditional practices [28].

There are open questions when designing technology that we could not properly fit in the *respectful technology space* typology. These included cultural wicked problems [48] and dissonant heritage [50]. One such encounter was the use of the *sotet* that we described in our findings. There was no consensus with the community whether this artifact and attendant IK associated with it can be considered *sacrosanct* – a symbol of sacredness, or *discretionary*: an object that can be used to display membership in the community and/or use as a decorative object. In this dilemma, we adopt Sheehan’s approach [48] that recommend designing to allow the community to

negotiate the meaning. For the case of the *sotet*, this can result either in a continued lack of consensus, or in the artifact adopting a dual meaning—the IK evolving in tandem with the consensus. The respectful approach empowers the community to negotiate and decide that eventuality for themselves, the space allowing for technology design to then amplify the community consensus.

CONCLUSION

In this paper, we considered the role that technology can play in the preservation of Intangible Cultural Heritage (ICH), and its Indigenous Knowledge (IK) subset. We interviewed museum curators/docents, cultural experts, and community members in the North-Rift region of Kenya towards describing a respectful space where both technology and culture can harmoniously exist. We consider implications that our respectful space recommendations has on expanding the scope of HCI4D theory and design.

We contribute in the following ways. First, our study demonstrates how current understanding on postcolonial computing and HCI4D can be expanded to more consciously navigate the indigenous space. This can be achieved by involving the community members and cultural experts in decision making towards negotiating the role of technology in IK. Second, we study the differences between how IK is presented by museum in comparison with the community and reveal both identity and colonial tensions in how the community feels they are being represented by the museum. Our recommendations are aimed at bridging the gap between what the museum and attendant technology overlook when considering museum-community interactions. Finally our *respectful technology space* typology offers opportunities for designers and/or museums to partner with communities towards negotiating boundaries for where technology is acceptable.

By examining the current community practices and describing a space that technology can inhabit in assisting the community to preserve their culture, we argue that this is the most effective space to address both the preservation and dissemination of indigenous knowledge.

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