Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

School of Computer Science and Statistics

Preserving Kenyan Oral Traditions Through Environmental Storytelling

By

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A Dissertation submitted in partial fulfillment of the requirements for the degree of MSc. Interactive Digital Media in Computer Science

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Submitted to the University of Dublin, Trinity College
May 14th 2025

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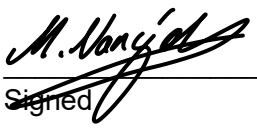

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Preserving Kenyan Oral Traditions Through Environmental Storytelling

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Acknowledgments. Special thanks go to my supervisor Sam Davern for providing me with the guidance and support that made writing my thesis possible.
I would also like to express my sincerest thanks to my mother and sister for their valuable cultural insights and consistent support throughout my research, which were crucial in the writing of this thesis.

Disclosure of Interests. The authors have no competing interests to declare that are relevant to the content of this article.

Abstract. Environmental storytelling is a form of storytelling commonly used in video games that relies on spatial design for the purpose of conveying a narrative. This paper analyses the potential of environmental storytelling in embedding Kenyan oral traditions in an effort to digitally preserve Indigenous oral literature through the use of Interactive Digital Narratives (IDNs). First, a literature review is conducted to find taxonomies and decide on definitions related to the topics of IDNs, Indigenous people, and environmental storytelling. Then, an interview analysis was conducted to explore the need, practicality and ethics behind the digitisation of oral traditions in IDNs. Finally, a prototype was developed to put insights from the prior sections into practice. We find that while environmental storytelling presents an opportunity in IDNs to preserve Kenyan oral traditions in a way that emphasizes multiple perspectives, challenges remain in the preservation of the storyteller's performance.

Keywords: Interactive digital narratives · Environmental storytelling · Oral traditions · Cultural heritage.

1 Introduction

Environmental storytelling is a type of storytelling that in recent years has gained relevance in contemporary video games as a way of adding depth to a virtual space. Its common use in the narrative structure of interactive digital media, however, often relies on other forms of storytelling to more explicitly communicate events throughout a story. Simultaneously, the preservation of oral storytelling from Indigenous Kenyan communities poses a challenge as methods of digitisation are insufficient in addressing the loss of intangible cultural heritage

while also lacking engagement and immersion for the audience. This paper addresses the need for modern digitisation methods for Kenyan oral traditions by exploring the usefulness of environmental storytelling for Indigenous stories, its advantages and disadvantages in practice and its effects on immersion for the observer.

1.1 Hypothesis

The hypothesis central to this research paper is that methods of environmental storytelling, meaning the design of space for the purpose of telling a story through navigation, could be useful as a primary form of narration in the process of digitising Kenyan oral literature and storytelling traditions due to their shared reliance on performance and interactivity. To investigate this hypothesis, a literature review is first conducted, which explores the state of the art in digital cultural heritage preservation efforts as well as definitions and taxonomies related to Indigenous people, interactive digital narratives (IDNs) and environmental storytelling. Afterwards, a set of clear research questions is formed which is used to inform interviews with researchers and educators in the domains of digital cultural heritage preservation, IDNs, and Kenyan literature and cultural heritage. A thematic analysis of the interviews will then be conducted before the results from that analysis are finally applied in a basic prototype, which encompasses elements from Kenyan oral traditions and environmental storytelling in an IDN.

2 Literature Review

This section discusses state-of-the-art methods, models and taxonomies related to digital preservation as well as the use of environmental storytelling in contemporary interactive digital narratives. As part of this, we will establish terms relevant to environmental storytelling and the digital preservation of Indigenous cultural heritage. These definitions are applied to the research conducted in the following sections of this thesis.

2.1 Definitions

Indigenous Peoples and Minorities Weaver[60] explains the concept of 'Indigenous Identity' as complex, multi-layered and highly debated, and reasons that no clear consensus on the definition of Indigenous People has been reached. According to the author, this is in part due to identities being constructed not solely within a group or as an individual, but in relationship with others through perceived differences between groups. As an example of this complexity, the author mentions that Native American identity came into existence because of contact with European colonizers. Furthermore, in the case of Native American identity, Indigenous identity is multi-layered since tribal identity, sub-tribal identity and "mixed-blood" can play a role in the way an individual identifies

themselves within a tribe, between tribes or in relation to non-Natives. Additionally, racism and internalized stereotypes of Native American identity can disincentivise the pursuit or make it more difficult for members to gain a better understanding of their Indigenous identity.

Weaver provides three key characteristics of indigenous identity: *self-identification*, *community identification* and *external identification*. *Self-identification*, according to the author, describes the expression of cultural identity relative to an individual's sense of self, which can change significantly through personal development and their understanding of Native identity. *Community identification* is defined by Weaver as a facet of Indigenous identity which requires confirmation from members of society who share that same identity by having a link to the same traditions, homeland and history, often in contrast to members of the dominant society, whose identities tend to be more strongly attached to their profession. Lastly, *external identification* consists of definitions regarding the Indigenous identity that are imposed upon communities by people and institutions outside of the Native identity, including federal policy makers. This can lead to recognition, nonrecognition or misrecognition of Indigenous people. For instance, the term "Indian" when referring to Native Americans is a label that misrecognizes and reinforces a stereotypical image of Indigenous people, according to Weaver. This perpetuation of stereotypes and mischaracterization in the dominant, non-Native society, can in turn affect the way Natives learn about their own culture, leading to the internalization of oppression as a result of colonization, which Weaver understands to be another common theme of Indigenous identity.

Sylvain[56] cites the definition presented in the Indigenous and Tribal Peoples Convention 1989 (ILO 169)[2], which explains that "self-identification as Indigenous or tribal shall be regarded as a fundamental criterion for determining the groups to which the provisions of this Convention apply". However, Sylvain also acknowledges that previous definitions of indigeneity are problematic in the African and Asian context for a variety of reasons, including the lack of distinction between ethnic minorities and Indigenous people as well as the questionable requirement of occupancy. This is especially difficult in the African context, where under the European colonization, most African people would be recognized as Indigenous. Researching migratory movements prior to European colonial powers in Africa, according to the author, makes the existence of social dynamics within people and tribes more apparent, with the claim of "first people" being different compared to that of Indigenous. Citing Stavenhagen[55], Sylvain mentions that, in the case of defining and supporting Indigenous people in Kenya, emphasis should be placed on experiences of dispossession of land and naturalization as well as marginalization, similar to that of other Indigenous people around the world, rather than on who arrived first. The author also lists cultural identities, political and economic marginalisation, and non-dominance

as potential socioeconomic indicators of Indigeneity.

In the case of East African Indigenous languages, Lisanza and Ndungo[2] differentiate between two major categories: *Dominant Indigenous languages* and *minority Indigenous languages*. The main difference between these categories is the socioeconomic power held by them. *Dominant Indigenous languages* like *Kiswahili* take over official roles in secondary domains such as in education and in courts and are commonly spoken as a second language by East Africans. *Minority Indigenous languages* like *Kikamba*, *Kikuyu* and *Kibukusu* on the other hand are associated with less power and officiality. Since the Kenyan constitution only recognizes English and Kiswahili as official languages and Kiswahili as the national language, all other African languages spoken in Kenya besides Kiswahili can be considered minority languages, according to Makoloo[44]. In contrast to Sylvain's understanding of the term "Indigenous", Lisanza and Ndungo apply the term to all Kenyan tribes and rely on the use of the term "minority" to imply lived experiences of marginalisation in Kenya.

The Kenyan constitution from 2022[5] defines an Indigenous community as a marginalized community which relies on a hunter or gatherer economy to sustain a traditional lifestyle and livelihood. Other communities that fall into the definition of the marginalised community as defined in the constitution are communities that are unable (e.g. due to their size) or unwilling (e.g. out of the willingness to preserve their culture) to fully participate and integrate into Kenyan society as well as pastoral communities. While this definition of "Indigenous" could apply to tribes like the Ogiek, Turkana and Endorois, Makoloo points out that, in the Kenyan context, other ethnic, linguistic and religious communities can be described as minorities and experience similar suffering in terms of political, social, economic and cultural discrimination, in part due to the importance of ethnicity in Kenya's institutions and the process of acquiring political power.

Interactive Digital Narratives Koenitz et al.[32] understand the term "interactive digital narratives" as one that combines research from various disciplines and is purposefully loosely defined, as it exists among similar proposals for narrative ideals in the interactive digital landscape. Such proposals mentioned by the author include Murray's "Holodeck"[24], constructive hypertext[14] and interactive drama[34], all of which, according to Koenitz et al., have been predominantly rejected. However, the lack of a standardised set of narrative structures, according to the authors, presents both problems and opportunities, since IDNs can function as a space for experimentation and lend themselves to different sets of ideologies and philosophies as well as political activism. Furthermore, the lack of definition opens the field of IDNs to anyone willing to identify with it.

In broad terms, Koenitz et al.[32] define IDNs as interdisciplinary projects taking advantage of recent developments in technological, artistic and analytical

fields. It can be distinguished from other media such as stage drama, books and moving image due to its use of procedurality, which enables designers to create an initial environment and define rules for interaction and interactivity. Within the environment, users can then react to the provided input by manipulating its state, thereby contributing to the story creation process as a result.

Inspired by Ascott's[12] theoretical framework for cybernetic art and Wiener's[62] "cybernetic art matrix", Koenitz[30] suggests that interactive digital narratives can be modelled as consisting of a *system*, a *process* and a *product* (SPP). The *interactive narrative system (INS)*, or protostory, is the digital artifact in its initial state, including the hardware it is stored on, and contains all of the potential narratives that the user can instantiate through interaction. The *process* is created when the user interacts with the system and is characterized by the user's actions and the system's options provided in reaction to the user. The end result of a process is the construction of a linear narrative referred to as the *product*. The purpose of this model is to emphasize the user's agency in the process of creating a narrative as well as the importance of the narrative system compared to that of the instantiated narrative structure.

Eladhari[17] explains that with every traversal of a story within an interactive narrative system, a unique product is generated and proposes a four-layered structure for IDNs consisting of *code*, *story*, *discourse* and *narrative*. Sharing narratives can take place both outside of the game in the form of oral re-telling, conversation and fan fiction as well as inside of the game through narratives shared as an avatar in the IDN's world. According to Eladhari the success of an IDN is indicated by its capability to instantiate stories memorable enough to generate re-tellings on the fourth layer, allowing for both positive feedback and critiques to contribute to the impact of a narrative system. The author points out that this way of modeling story construction can be seen as an extension of the three-tiered SPP-model proposed by Koenitz.

Furthermore, Roth and Koenitz[50] see the following three dimensions of user experience as key to measuring the experience of an IDN's user:

- **Agency:** the capacity to take meaningful and satisfying actions within the process
- **Immersion:** an activity requiring participation and complete attention from the user
- **Transformation:** personal engagement with the product

Hence, the creation of narratives as defined by Eladhari's fourth layer could be seen as a way of successfully making transformative experiences for users.

Koenitz[31] proposes a design process for IDNs that consists of four phases: In the paper phase, the general structure of events, environment definitions and settings are outlined and a clear understanding of sequencing, choices and impacts on the system is established using a flow diagram and index cards. In the

prototype phase, Koenitz recommends the use of an authoring tool to create an initial prototype without assets to test interactions and narrative pacing as well as to adjust the narrative structure. During this phase, the index cards from the paper phase are used to inform the list of necessary assets. Then, as part of the production phase, further refinements to the narrative structure of the IDN are made and assets are implemented. Final adjustments are made in the testing phase, where a group of testers attempt to find unexpected behaviour in the prototype.

Different design principles mentioned by Koenitz include the *cyberbardic principle*, which asks designers to consider the audience as interactors instead of readers or writers and lacks a clear reward structure compared to video games, the *initial interest principle*, where designers are meant to start the narrative off from a challenge or question that is meant to entice the user, the *continued motivation principle*, where the IDN attempts to maintain the interactor's interest in the narrative by managing the amount of answers and information revealed to them over time and the *opportunity magnitude principle*, in which as much narrative material as possible is provided in order to satisfy the interactor's need for meaningful choice and content.

Environmental Storytelling In this subsection, we will explore and compare different taxonomies and approaches to environmental storytelling, including those preluding the term itself, to inform the design process of our prototype.

Emergent Narratives Fernandez-Vara[19] explains environmental storytelling as a term referring to "how spaces can evoke and construct a narrative experience while navigating space". The term was borrowed from the field of theme park design and popularised in the context of video games by Carson[4] and Pearce[45]. Carson sees a commonality between video games and theme parks in the way environments are designed for the purpose of entertainment. According to them, since the physical environment of a theme park ride has aspects of the story infused into it, space plays an important role for designers in conveying a story. Therefore, rather than fully relying on strictly presenting the details of a story, Carson emphasizes the importance of using the physical space of theme park rides to evoke the story's atmosphere based on rules derived from the story instead. Pearce further enhances this concept by categorizing environmental storytelling in video games into four models:

1. **Classical narratives** rely on broad sets of goals for a protagonist and are commonly found in films.
2. **Micronarratives** are more common in video games and lend themselves to episodic storytelling.
3. **Embedded narratives** centre around the observer's or agent's narrative comprehension.

4. **Emergent narratives** are unstructured and can be found in simulation and sandbox games. These games typically integrate elements of storytelling while also equipping the player with tools for authoring their own stories.

Indexical Storytelling Fernandez-Vara points out the term environmental storytelling has in the meantime been widely adapted by the gaming industry and become a discussion topic among game designers . In their survey, the author proposes the concept of "indexical storytelling", which refines the idea of environmental storytelling and constructs a narrative through indicators and traces left in the environment. Indexical storytelling can find common use in specific game genres like detective or stealth games. As an example, Fernandez-Vara names the blood stain mechanic popularized in Demon's Souls[20], which allows players to learn about their environment and upcoming obstacles by interpreting the moments preluding another player's. To do so, the mechanic requires the player to explore the world, find and activate a bloodstain, which then causes an animation to played showcasing another player's death at that location. Portal[57] and Bioshock[11] are also mentioned as video games which make use of this form of storytelling. Indexical storytelling can not only assist in telling the stories from the game's world but can also enable players to create their own stories by making their impact on the environment permanent. This versatility, concludes Fernandez-Vara, gives indexical storytelling a lot of potential for creating new types of narratives based on different types of interactions in the future.

Archaeological Storytelling As mentioned by Ryan[3], Livingstone et al.[27] describe a similar refinement of environmental storytelling in archaeological storytelling. Mainly relying on artifacts as its primary device, archaeological storytelling requires the player to use scientific techniques and deduction, and, in the context of archaeological games, allows players to derive knowledge about a culture using its material remains. The authors explain that this type of storytelling allows multiple storylines to have equal weight as the player's interpretation is needed to fill in the backstories of characters from all backgrounds. Livingstone et al. conclude that while archaeology is a common trope in popular video games such as the Uncharted[40] and Tomb Raider[16] series as well as Shadow of Mordor[46], the analytical thinking required for archaeology is rarely accurately represented, mainly due to video game narratives often only allowing one correct understanding of the story. This contrasts with archaeology where the limited nature of knowledge about a lost culture makes deriving a single objective answer about it not only impossible at times but also an undesired approach since rethinking previous explanations due to new findings is a common occurrence. Furthermore, the authors emphasize the importance of archaeological thinking for students and conclude that archaeological storytelling could be an effective method both for developing educational games for archaeology students and for storytelling in video games in general.

Reinhard[47] argues that another benefit of open-ended video games, both in terms of spatial exploration and in terms of lacking pre-defined goals, is that

they can provide cultural uses to its player base similar to real-world archaeological sites. With video game environments changing over time through large investments from their communities, which often have their own economy, form (sub-)groups and modify gameplay through various mechanical, natural or human means, Reinhard explains that they can fulfil all of the requirements of an archaeological site formulated by Holtorf[25]. The author therefore concludes that video games have become sites for a form of archaeology that is centred around hybrids of virtual and physical environments.

Reinhard further explains that the real world and interactive virtual media are not, as is commonly stated, largely separate from each other but that virtual environments are instead a place where experiences are generated through imagination and then carried into real world. Similarly, experiences from the real world affect the decisions and interactions players have in virtual spaces, thereby causing the two to influence each other.

According to Reinhard, despite the established use for video games to present archaeology, studies related to archaeogaming have only slowly emerged over time. These studies include both the history of video games themselves and the design and integration of archaeology, history, heritage, and culture in video games.

Environmental Types In the field of environmental psychology, Salter's[52] taxonomy introduces different environmental types to examine the behaviours of different personality types, according to four dimensions:

- **Extraversion** and **Introversion**
- **Judging** and **Perceiving**
- **Sensing** and **Intuition**
- **Thinking** and **Feeling**

The *extraverted sensing (ES)* environment , according to Salter, is supposed to induce energy into an environment using elements that are highly stimulating to the senses and tends to be superficial in its presentation. Environments that fit into this category might fulfil a fundamental need for the participant such as food or shelter and are therefore unavoidable and invite behaviour that seems natural.

The *introverted sensing (IS)* environment tends to be highly specialized and focuses on a single key element in the scene, with the purpose of enhancing concentration on the element. One example for this type of environment in video games are repair workshops, which typically centre around a single craft that is improved upon over time to complete the repair or restoration process more efficiently.

Extraverted intuitive (EN) environments invite players to explore and create their own stories by deducing information and finding environmental patterns,

potentially across different disciplines. Spontaneity is rewarded by giving the player a variety of options, which tasks players with experimenting with their intuitions and can eventually lead to feeling overwhelmed. EN environments could be seen as especially useful for archaeological storytelling, where interpreting and changing the environment is also encouraged.

The *introverted intuitive (IN)* environment is described by Salter as one where elements are not superficially connected but rather through hidden relationships. Symbolism and themes such as mysteries and magic can find place in this type of environment, with connections being abstract and not found in the external world of the video game on purpose to create a sense of discovery along with a personalized experience . This environmental type could potentially find use in indexical storytelling as mechanics might require an understanding of not only the game's world but also of cultural knowledge outside of it.

Extraverted thinking (ET) environments are described as containing a clear and predictable set of rules to assess player behaviour. Additionally, resources and challenges are not easily identifiable but might require a certain level of skill to manage. This invites comparison of skill since a clear distinction between winners and losers can be made, giving a competitive nature to ET environments.

Introverted thinking (IT) environments, in contrast to ET environments, have an at first unclear set of rules that requires methodical exploration in order to uncover patterns and eventually the underlying science of the environment. In this process, players might end up manipulating the environment to reduce a problem to its simplest form and eliminate any disruptive factors in order to test a hypothesis.

Extraverted feeling (EF) environments focus on creating positive social interactions between individuals and fostering interpersonal relationships. By inviting players to participate in group processes, ET environments aim to create community and attachment within a network of players . Therefore, players in EF environments attempt to support active participation from users in social dynamics and group settings.

Finally, *introverted feeling (IF)* environments focus on individuals rather than communities. Often expressing beliefs about humanity, IT environments rely on the player listening to the expressed value before rewarding them by allowing the self-expression of other values . For physical items, sentimental value plays an important role in IF environments.

Video Games as Virtual Indigenous Cultural Heritage Sites Majewski[33] categorizes approaches of preserving indigenous culture through video games into the following types: *commercial games*, *serious games*, *culture-centric*

games, and player-developed *modifications*. In the following section, we will apply these categories to titles which digitise indigenous cultural heritage in order to analyse the advantages and disadvantages in approaches.

Commercial Games Commercial games predominantly focus on delivering a product with mass appeal and prioritize entertainment over cultural education for its player base. One major benefit of using commercial games as a device for retaining indigenous cultural heritage is that their aim to create entertaining experiences allows for a larger player base to learn about and develop an interest for the cultural heritage that is informing the virtual environment. In addition to that, the potential for financial profit from commercial games provides another reason for investment that is missing from most Serious games, mods and many culture-centric games. This financial incentive, however, poses a conflict of interest to cultural heritage preservation efforts with Majewski reasoning that due to the lack of commercial benefit in cultural and historical accuracy, stereotypisation is common in commercial games, therefore making them undesirable for academic or educational purposes. One example of a commercial game including indigenous cultural heritage in its environment is Assassins Creed 3[37], as mentioned by Joyce[28]. They highlight the game as an example for the potential video games hold for retelling narratives to purposefully counter common tropes about Indigenous people while also arguing that the game fails to do so despite its featuring of a Native American protagonist. Joyce mentions that while Assassins Creed 3 attempts to portray Native American characters in a positive light, it still adopts embeds a Western, oversimplified understanding of history into its narrative and gameplay, which, in part, could stem from its assumption that the player is likely non-Native, leading to the perpetuation of stereotypes when, instead, a worldview counter to that of the dominant culture about colonialism in America could be presented. As an example, the author mentions a post-credit scene in the game, illustrating that despite any actions taken throughout the game did not accomplish a meaningful change in the outcome for the protagonist. Instead, argues Joyce, AC3 could have constructed a counterhistory, in which the player could alter the course of history through their choices and produce a narrative with a positive outcome for Native Americans.

Serious Games Majewski describes Serious Games (SG) as designed specifically for the purpose of preserving cultural heritage as accurately as possible with the explicit goal of providing educational value. Mortara et al.[38] similarly consider SGs to be particularly equipped to educate players through creating empathy with subjects. One example of a Serious Game is the *Trebinje Fortresses* VR project presented by Rizvic et al.[49]. The authors' approach to provide storytelling for fortresses in Bosnia and Herzegovina relies on Serious Games to embed cultural heritage experiences across multiple forms of digital media. By presenting cultural heritage in virtual reality using the "Advanced Interactive Digital Storytelling" methodology, which is based on the "Interactive Digital

Storytelling" approach presented by Barbara and Haahr[13][22], high user satisfaction among participants regarding gameplay and edutainment was reported. Barbara and Haahr also postulate that museum games would benefit from adapting their multimedia storytelling to newer technologies. Another example of a Serious Game is Taiwan Epic Game created by Shih et al. with the intention of preserving Taiwanese cultural heritage and history. By placing the player into an environment inspired by local Taiwanese culture and literature, the authors received positive feedback related to increasing awareness about Taiwanese cultural heritage, according to Shih et al..

Culture-Centric Games Culture-centric games are defined Majewski as titles that are either commercial or intend to imitate the mass-appeal of commercial titles while maintaining the representation of cultural heritage as a key aspect. While this approach can function as a meaningful compromise when addressing tensions between academic and commercial interests and help academics in reaching a wider audience, according to the author, this approach can lead to both a reduced audience size and a reduced capacity to accurately portray cultural heritage in the case of commercial games.

One example of an Indigenous, culture-centric and commercial game is *Never Alone*[21][6], which was released by Upper One Games in 2014, as mentioned by the Cook Inlet Tribal Council (CITC)([36]. The story of *Never Alone* is based on stories told within the the Iñupiaq community and was created in collaboration with Alaska Native storytellers. *Never Alone* follows the story of Nuna and Fox, who are exploring the Alaskan nature during an eternal blizzard to find its origin and save their home. While exploring the environment, players are encouraged to learn about Iñupiaq culture. This is done using visual art inspired by cultures native to Alaska and integrated into the level designs along with animated cutscenes containing voice over narration provided by native storytellers in the Iñupiaq language. Fredeen, executive vice preseident of CITC, mentions that 24 cultural ambassadors were included in the development of game, providing both technical and values-based advice in an innovative collaboration process with Alaska Native partners. The immediate success of *Never Alone* upon release brought with it an increased interest in Indigenous games and paved the way for the "world games" genre.

Another Indigenous culture-centric game in this genre is *Skábma: Snowfall*[23], released by the Finnish video game studio "Red Stage Entertainment" in 2022. The video game mainly centres around the Saami, an indigenous people native to northern European countries including Norway, Finland, Sweden, and Russia. The lifestyle, culture, and livelihood of the Saami people are under threat from a set of factors including climate change, urbanization, globalisation, and societal changes, forcing Saami to assimilate with majorities, according to Jaakkola and Jouni[26]. Notably, all Saami languages are considered endangered or highly endangered, with nine out of ten languages still being spo-

ken. *Skábma: Snowfall* builds its world using traditional Saami knowledge from which it then bases its fictive story, which is mainly delivered through dialogue in davvisámegiella, the most widely spoken Sami language. Like *Never Alone*, one of the main gameplay characteristics of *Skábma: Snowfall* is the exploration of the wilderness native to Saami, creating a connection between spiritualistic worldview of the Sami and the experiences players have when navigating the environment. However, *Skábma: Snowfall* introduces on a wider set of characters for its delivering of narratives. As Cengiz[23] mentions in an interview with *The Gamer*, the expressive visual appearance of the spirits had to be compromised due to the lack of resources available to the studio, pointing to the small amount of Saami people in general and especially with a background in game development. Additionally, Auranen[53] mentions that the scarcity of documentation regarding Saami people meant that a lot of reference points for *Skábma*'s setting were oral traditions told to her by her grandmother, along with historical records from the 16th to 19th century written by people outside of Saami culture. Cengiz also references the success of *Never Alone* as one of the main inspirations for the development of *Skábma: Snowfall*.

Mods Mods are typically community generated modifications of previously existing games. In the context of cultural heritage, these modifications can come with a recontextualization and repurposing of the game's environment for a new story. While the drawbacks to this approach are the clear restrictions put by the game's engine and potential lack of tools and rights for modifying the game, one of the benefits of this approach is the lessened impact of financial incentives and academic barriers allowing underrepresented perspectives to receive an unfiltered platform . One example of a game mod used for cultural heritage preservation mentioned by Majewski is *Brytenwalda*[1], a mod for the game *Mount & Blade: Warband*[18] which transformed its environment into that of 7th century Britain and was eventually worked into the game officially as part of the *Mount & Blade: Warband – Viking Conquest* DLC.

2.2 Digital Storytelling for Kenyan Communities

In preparation for the research conducted in the interview analysis and prototyping sections of this paper, this subsection discusses current practices regarding Kenyan oral traditions, including folktales, songs and proverbs, along with methods of oral storytelling. Furthermore, challenges in the digitisation process specific to Indigenous Kenyan communities are discussed.

Oral and Visual Storytelling Traditions According to Somjee[54], in the East African tribes Maasai, Rendille, Akamba, Marakwet and Kalenjin, both oral and visual traditions are actively used for communication and are often not explicitly differentiated. However, in the academic process of transcribing them into written text, Somjee explains that complexity captured by these forms of

communication is often lost.

Both visually, through cultural artefacts, and verbally, through oral performances, complexity relies on a familiarity with the culture to generate and communicate knowledge. As an example of this, Somjee recalls an anecdote related to the 'emurt naork', a necklace which contains knowledge of the Maasai tribe based its color scheme. Upon asking, a local was able to provide Somjee with three different oral traditions, explaining the information stored in the ornament in the process and showcasing the role of visual language in East-African oral storytelling traditions. Additionally, material culture and oral traditions both share methodologies found in literary, art and ethnographic studies and are interactive with each other as they rely on performance, audience participation and applause.

Another barrier in communicating complexity in East-African oral traditions outside of the East-African context is the necessity of relying on multiple languages. Somjee finds that in the process of researching about oral and visual traditions, one typically relies on three different languages to transfer knowledge:

1. **Tribal languages**, from which the narratives often originate (similar to Indigenous minority languages),
2. **Swahili**, which is commonly spoken as a second language by locals, and
3. **English**, which is the established language in the academic context.

Somjee concludes that, to enhance the quality of transcripts for the purpose of cross-cultural sharing, visual and oral data points should be collected and cross-referenced.

Reitmaier et al.[48] mentions that cultural bias of researchers towards hypervisual storytelling can hinder the process of digitising stories from rural African communities. According to the authors, since culture around storytelling significantly affects user interactions, their bias towards Western and urban storytelling culture, which is more reliant on visual aspects of storytelling methods, affected every activity and design decision in their cross-cultural research. Furthermore, the authors explain that the notion that literacy implies objectivity, and detachment can lead to achievements in oral performances being overlooked. This, in turn, makes meeting the storytelling needs of rural African communities, which often require face-to-face interactions and are more reliant on the relationships between storyteller and listener, more difficult. This prioritization of oral storytelling was shown in their research when, after prompting participants from both a Luo community in Kenya and a Xhosa community in South Africa to create digital stories of their choice using mobile devices capable of recording audio and video, the Luo participants decided to record audio first and appeared to have difficulty with depicting a story in photos. Despite problems in overcoming cultural barriers in the use of digital media, the authors see digital storytelling as a

potential way to preserve and share information within disenfranchised communities for personal growth, economic benefit and improved decision-making and emphasize the need for cross-cultural design in ethnography, arguing that this insight should be used to improve on their inherently flawed methods to allow for more accurate ethnographic comparisons.

Challenges in relying on *Information and Communication Technologies (ICTs)* for digitally preserving Bukusu oral traditions identified by Weng'ua[61] include the cost associated with acquiring ICTs, poor infrastructure, funding and insufficient skills in using ICTs. As mentioned by Weng'ua, Kimutai et al.[29] find similar challenges in the use of ICT for Indigenous cultural heritage preservation in the North Rift region of Kenya, noting the lack of electricity, computer hardware and software, inaccessibility of primary education and lack of teachers - especially with ICT literacy – as major challenges in the region. Despite this, the authors find that, when implemented in a way that understands the needs of Indigenous peoples, ICTs are powerful in preserving their traditional culture and suggest a wide span of application fields for ICTs, including the development of digital stories which educate users on traditional proverbs, their meanings and examples of how they can be applied in the relevant minority Indigenous language as well as Kiswahili and English.

Kenyan Folklore

Proverb Omari[43] defines *proverbs* as a broadly fixed, short form of literature, characterised by its acceptance by the public as common truth. Proverbs are often meant to pass on wisdom and experiences and can provide observational comments or insights on life, as is also pointed out by Wanzala et al.[59] in their research on proverbs from the Bukusu community in the Bungoma county in Western Kenya. For instance, Wanzala et al. explain that the Bukusu proverb "Chingekhanga yebusia", which translates in English to "He who has made a mistake is always quick to defend himself", is a proverb used in the context of a trial or a similar situation and is meant to help in finding a guilty party by pointing out defensive behaviour as suspicious.

Omari, however, finds that traditional proverbs are typically challenged and eventually become out-dated over time. Because of this, proverbs rely on transformations from younger generations to remain relevant. Analysing the role of social networks in modernising Swahili proverbs, Omari finds that social network users tend to adjust and repurpose existing proverbs according to modern contexts, both genuinely as new proverbs and in the form anti-proverbs, which parody or otherwise play with traditional wisdom. Adjustments are often made by social media users to the structure and performance of the proverb (e.g. language, sound, grammar, metaphors, etc.) and to the worldview and opinions expressed in the proverb. Motivating factors for the modern adaptation of proverbs

include neo-colonialism and globalization, both when addressing concerns and when introducing new language, as well as individualism. Omari therefore sees social networks as a viable source of data when conducting research on the collection and study of proverbs. Similarly, a study conducted by Wanzala et al. found great evidence of an erosion of traditional proverbs despite the active practice of proverbs in Bukusu clans and sub-clans today. According to the authors, key factors contributing to this include untimely deaths, the extinction of traditional ethnopractices and the modernisation of cultural and traditional lifestyles among others. Hence, modern technology is not only relevant in current practices related to the use and modernisation of proverbs, but can also find application in the preservation of traditional proverbs.

Songs Mbele[35] mentions that Swahili poetry contains a variety of forms, including *shairi*, *utendi*, *ukawafi* and *wimbo*. The author goes on to explains that recitations from Swahili women common often a primary source of Swahili oral traditions and literature, as is the case in their analysis of the song "Wimbo Wa Miti". This song uses a vegetative environment to metaphorically describe tensions between women of a community and a call to peacefully resolve them. Mbele's source Maimun explains that the song stems from a time much earlier than that of her grandmother when misunderstandings and tensions between the women of Lamu town led to the female composer of the song describing the situation using trees as metaphors with the goal of reconciliation. This practice of using plants as metaphors for women is common in Swahili poetry, according to Vierke[58], with trees and plants generally playing an important role in Swahili poetry as botanical entities, elements of the environment and as a literary metaphor for women. Furthermore, Vierke mentions that plants have a long history in Swahili literature of being used metaphorically to convey messages that would be inappropriate to state openly. By applying an ironic tone and anonymizing all parties involved in the dispute through their depiction as trees, conflict resolution was assisted in a socially acceptable manner. Additionally, the personalities of the women featured in the story are associated with specific trees according to the characteristics of both the individuals and the trees. For instance, the pepper plant tree, represents a hot-tempered woman.

Citing Harries'[8] description, Mbele categorizes "Wimbo wa Miti" as part of the enigma verse tradition, which describes a popular genre of Swahli poetry which uses figurative language, allows for multiple interpretations and has the purpose of posing a riddle for a specific audience to solve. Mbele mentions that "Wimbo wa Miti", like many other enigma verses, was composed to be sung at wedding ceremonies. However, while traditionally enigma verses were exchanged as a form of challenge or communication between poets, in this case, it is used to mock the audience while also providing critical social commentary in an engaging manner. Additionally, Mbele mentions that it is common for Swahili poetry not only to have many variations over time but across multiple tribes with some variations being almost identical apart from some key words being replaced to

recontextualize the song.

Another example of the Swahili language relying on indirect expressions to productively address difficult to broach topics lies in the context of death as mentioned by Biseko[15]. After analysing videos featuring discourse on the afterlife in Kiswahili, which mainly consisted of funeral speeches, the author found that many Swahili speakers rely on euphemisms and metaphors to avoid harsh phrasing when discussing death. The use of these literary devices, concludes Biseko, likely lies in consoling family members over focusing on religious frameworks. Examples of this mentioned by the author include the use of the term "Nyumba ya milele" ("eternal home") over "Kaburi" ("grave") and the expression "Alale pema peponi" ("May they sleep peacefully in heaven") using sleep as a metaphor for death.

Ntarangwi[41] finds that music is an important tool in Swahili communities to facilitate the collection, interpretation and distribution of knowledge, political discourse across and within communities themselves, especially in areas that lack access to technologies. The author explains that experiences unique to the Swahili sociocultural identity are commonly expressed and shared with communities outside of Kenya in an effort to remain multicultural while also being part of the Kenyan national identity. The use of music in context comes with the benefit of being able to localize and adjust the meaning and transmission of information according to local languages, culture, modes of transmission, problems and capacities.

Summary Regarding the use of the terms Indigenous people and minorities, for the scope of this paper, we will define the term Indigenous as suggested by Lisanza and Ndungo, after discussing examples of narratives in oral literature from both dominant and minority Indigenous languages. More specifically, highlighted works included Kiswahili and Kibukusu oral literature, which originate from the ethno-linguistic minorities Waswahili and Bukusu, as explained by Makoloo. Doing so allowed us to include a variety of use cases and current practices of oral traditions in Kenya and similarities and differences in modernisation and preservation efforts. While both Swahili and Bukusu oral traditions are actively practiced in the form of songs, poetry and combined with visual storytelling, clear signs of erosion of cultural heritage are present. These findings were incorporated in preparation for the interview analysis.

For the creation of an IDN prototype, our approach is inspired by the prototyping design process proposed by Koenitz. The environment chosen for this prototype will be designed according to the extraverted intuitive environmental type suggested by Salter. Furthermore, the serious and culture-centric game type will be taken into consideration for the IDN prototype as both educational and entertainment value is considered.

The types of oral literature analysed in this literature review will also inform the choice of oral traditions digitised in the prototype, with proverbs and riddles being the main options due to their brevity and ability to be repurposed and modernised.

3 Research Questions

Based on our findings during the literature review section of this paper, we have refined the research questions for this thesis as follows:

1. What are current challenges in digitally preserving Kenyan oral storytelling traditions for Diaspora communities?
   (a) How has environmental storytelling evolved in interactive digital media?
   (b) Is environmental storytelling viable as a primary device for preserving cultural heritage in interactive digital narratives?
      i. What are the benefits and drawbacks?
      ii. For which types of IDNs is this approach best suited?
   (c) Does environmental storytelling increase empathy and/ or immersion for players in a virtual environment?
      i. How does environmental storytelling affect the presentation of complex and often untold, intersectional stories from marginalized communities easier?
   (d) How is environmental storytelling used in contemporary indigenous cultural heritage projects?
2. Can Kenyan digital narratives use environmental storytelling to preserve oral storytelling traditions?
   (a) What methodologies are available to Kenyan digital narratives to find a balance between preserving traditions and remaining accurate while also creating an immersive interactive experience that is accessible to a wider audience?

4 Interviews

4.1 Participants

Two participants were chosen based on their expertise in one or multiple of the following domains: interactive digital narratives, African oral literature, education and the preservation of cultural heritage. Participant 1 (P1) is a researcher and IDN designer based in Malta focusing on the representation of complexity in Neolithic, prehistoric cultural heritage through interactive digital narratives. Participant 2 (P2) is a retired Kenyan literature teacher, whose previous work focused on East African literature, including oral traditions.

4.2 Methodology

For these interviews the approach of thematic analysis (TA) was selected as presented by Braun and Clarke[7]. The reason this approach was selected because of its ability to handle small sample sizes, which is accommodated for by the flexibility in methodology allowed by TA, as explained by the authors. Furthermore, interviews were conducted in a semi-structured way, based on material from Nyanchoke et al.[42], to allow participants to speak on their preferred subjects more freely. Interviewees were contacted via email by the author, informed about the purpose of the interview in advance and interviewed online via video call. Questions and potential follow-up questions, which can be found in appendix A, were prepared in advance for the interview with participants receiving the interview template ahead of time. The overall structure of the interview templates and questions was based on the approach laid out by Nyanchoka et al.[42]. The main topics addressed by the interview questions are intended to lead to discussion about 1) the current role of environmental storytelling in contemporary research in cultural heritage preservation, 2) the effects of environmental storytelling on immersion 3) comments on and potential criticism of the preservation of (Kenyan) oral storytelling traditions in interactive digital media, and 4) how a balance between storytelling and accuracy and immersion and entertainment can be found.

Additionally, the approach for the thematic analysis was inspired by refinements proposed by Naeem et al.[39]. First, statements from both interviews were selected according to their potential relevance to the research questions. Then, keywords were created based on importance and expressiveness in the context of the statement. In the next step, codes were generated from the keywords, generalizing the data points even further. Finally, three themes were chosen which summarize and group codes and create a clear relation to the research questions.

Theme	**Code**	**Keywords**
UNDERSTANDING BUKUSU CULTURAL HERITAGE	**Bukusu narratives**	Bukusu are Luhyas
		Riddles were children's domain
		Give hope but deter mischief
		Scare especially girls
		Nightmare-ish experience, but allowed to return
		Children entertained; taught; kept awake
		Joy and duty to narrate
	Need for modernization	New way of storytelling
		Children relate more to American
		People maintain taboos or cultural norms
		Few still telling stories
		Fast being eroded

		Children learning mother tongue
DIGITISING ORAL TRADITIONS	**Interactivity in Oral traditions**	Present audience
		Allow audience participation
		Initiative with storyteller
		Author is the original man forgotten
		Storyteller would need to fill gaps
		Information tends to be changed
	Loss of performance	Transcription translation and interpretation was done in writing
		Lost originality
		Missed voice and tone of variation
		Lose gestures, facial expressions
		Might require more time
		Calls for support
ENVIRONMENTAL STORYTELLING FOR BUKUSU DIGITISATION	**Accessibility of Bukusu digitisation projects**	Compromise long narrative
		Kiswahili or English version
		Little children
		Music festivals captured on YouTube
		Accessible to your culture
	IDNs in cultural heritage preservation	State tracking
		Personal linkage
		Consider different interpretation
		AI Moderator
		Cultural insiders
		IDN could change the happening
		Representation of cultural insiders
	Use of environmental storytelling	Inspired by the site itself
		Spatial exploration engagement and dependencies
		Start with tangible cultural heritage

4.3 Results

Analysing the two interviews revealed three underlying themes:

a) Understanding Bukusu culture
b) Digitising oral traditions
c) Environmental storytelling for Bukusu digitisation

Themes a) and b) relate to research question 1, which covers current challenges in for Diaspora communities in consuming digitised Kenyan oral storytelling, as they address the current state of Bukusu culture along with narrative tropes and morals common in Bukusu narratives. Theme c) relates to research question 2, which discusses the use of environmental storytelling for Kenyan digital narratives.

In addition to that, we find some overlap in expertise collected from our two participants across the generated themes as shown in our conceptualization. We also identified the relationships between the themes and codes found in our interview data: the digitisation of Bukusu oral traditions requires an understanding of the unique characteristics of Bukusu culture, including intended target audience, narrative structures, use of specific storytelling methods, elements and the urgent need for modernization stemming from a fast erosion of Bukusu culture, which affects the choice of language options available, as well as understanding of obstacles common in the digitisation of oral traditions, including the loss of performative and interactive elements in the transcription, translation and interpretation process. The use of environmental storytelling in IDNs for digitising Bukusu oral storytelling is in turn guided by findings from current methods and obstacles in digitising oral traditions and local academic practices for preserving Bukusu oral traditions. Finally, the understanding of Bukusu culture can in return benefit from the use of environmental storytelling, as additional perspectives on existing stories can be explored more easily for individuals, highlighting otherwise underrepresented understandings of history and cultural heritage. This quasi-circular relationship between themes could also suggest an interdependency between cultural heritage, digitisation and modernization.

In discussing the results of the interview analysis, we will go over these themes in detail, explain the individual codes and give examples of quotations that led to their creation. These results are crucial in the generation of the prototype as they inform decisions with regards to the use of language, accessibility, and the choice of environment in which the IDN will take place.

Understanding Bukusu Culture This theme consists of codes which contain keywords that are mostly generated from quotes from our interview with the second participant, the Kenyan oral literature teacher. This theme addresses the reasons for the urgent need for modernizing ways of preserving Bukusu literature as well as foundational aspects regarding Bukusu narratives.

Bukusu Narratives In the second interview, information vital to understanding Bukusu narratives was brought up, including the idea that the moral of story commonly attempts to provide hope while also deterring mischief. For instance,

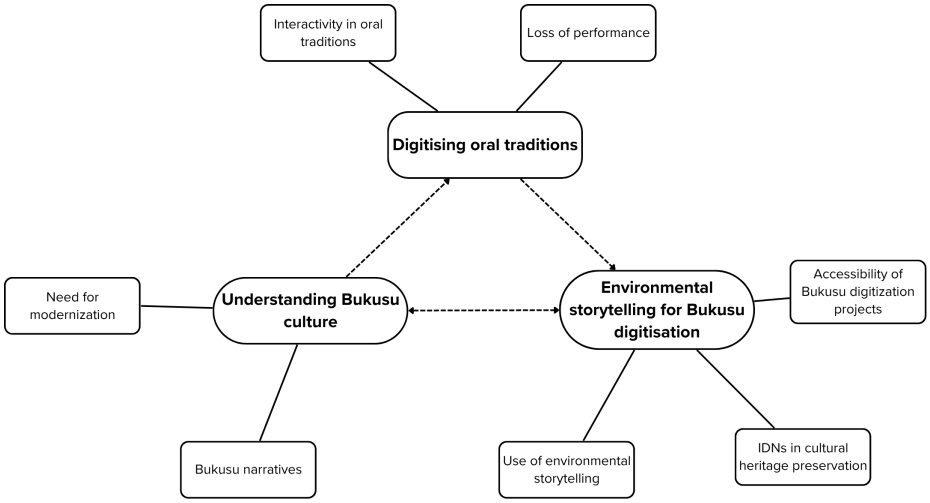

Fig. 1. Thematic analysis: conceptualization

some stories that were addressed at girls attempt to scare them away from dangers posed by men. Generally, child-friendly Bukusu oral literature has the primary purpose of keeping children awake as dinner is being prepared by their mothers while also teaching about Bukusu morals.

> P2
> "[. . .] the riddles came before the stories, so the riddles, they entertain the **children**, especially, it was their domain. So, they got **entertained** by the riddles, but meanwhile, it sharpened their skill, their- their intellect, their wit, and so on, because it was competitive. It (pause) also **taught** them a lot about the- their environment, because it talked about maybe the trees, the birds, the whatever- that is cultural in the environment there, but more importantly, it **kept** the children **awake** while the mothers were preparing the evening meal."

> P2
> "[. . .] but the morality is that there is there is life at the end of this thing. Yeah, something like that, just to give- to **give hope**, **but** also [. . .] to **deter** any kind of **mischief**."

Need for Modernization In the interview with P2, the rapid erosion of Bukusu culture, accompanied by the declining numbers in native speakers in younger generations, were mentioned as reasons for the urgent need for modernizing preservation efforts for traditional Kenyan oral traditions. Additionally, the interview with the IDN researcher and educator mentioned the need for a new type of storytelling in order for new interpretations of history to be explored.

P2
"[. . .] most of our culture is **fast being**, let me say, **eroded** (laughs). [. . .] a lot of our children do not speak our language, and if they do, they don't do it fluently, because already we have, like, four languages that a child may in his life encounter [. . .]"

P1
"[. . .] one of the curators, I came across a paper of hers where she complained that we keep repeating the same old interpretation and not give chance for new interpretations to be explored. [. . .] she also said we need a **new way of storytelling** for this."

These quotations reveal context for some traditional Bukusu narratives and their purpose, which will serve as crucial information in the design of culturally sensitive IDNs as they point out the importance of providing entertainment while also teaching morals and the environment for child-friendly narratives. In addition to that, the quotes also stress that the shrinking numbers of Kibukusu native speakers and the erosion of alternative perspectives by dominant societies demand new solutions for storytelling.

Digitising Oral Traditions This theme focuses on the interactivity and subjectivity in oral traditions and how these aspects of intangible cultural heritage get lost in the digitisation and transcription process.

Interactivity in Oral Traditions As shown by the key codes below, both of our interview participants pointed out the interactivity and subjectivity on behalf of the oral storyteller, who can adjust narratives depending on the relationship with the listener, the morals and gender roles that are taught, their personal style and the audience who in some cases can participate in the story through song interludes.

P2
"[. . .] Like, we took turns to tell the story that you knew. Hmm, sometimes you could tell it twice or so, but the idea was to tell a new story every now and then. So, these stories, no one is the writer- (stutters) No one is the author. [. . .] The **author is the original man forgotten**."

P1
"there's also this dynamic of who is the **storyteller**? To who is it being told? What is the influence that they can have on this storytelling and how does that play along? [. . .] the **gaps** that are not known, storytellers, **would need to fill** them in for the story to make sense[. . .]"

Loss of Performance A variety of performative elements from oral literature can get lost in the transcription process, as mentioned by our second interviewee, including tonal variations, gestures, and facial expressions. In the following key codes, examples of lost elements are given.

P2
"[. . .] what you would lose there, of course, would be the **voice** (stutters) of the narrator **and** (stutters) if you are doing, like, say, if it is an animal story or even just human beings, the **tone of variation**."

P2
"[. . .] You would also **lose** the **gestures** that the narrator is using because they totally enhance the story. You'd miss out on that. [. . .] You'd also miss the **facial expressions**[...]"

The quotes featured in this theme highlight the potential advantages of transforming oral traditions into IDNs by showing the overlap in audience engagement between the two. However, as they also point the loss of the narrator as a subjective performer and interactor distinct from the audience, difficulties in the use of environmental storytelling for capturing performance become clear.

Environmental Storytelling for Bukusu Digitisation This theme summarizes suggestions for ensuring the accessibility of Bukusu digitisation projects, the use of IDNs in cultural heritage preservation and the role of environmental storytelling.

Accessibility of Bukusu Digitisation Projects Suggestions for digitising projects in a way that is both more accessible and palatable for younger Bukusu audiences include providing English and Swahili translations as well the creation of short-form content and designing interactive content for younger audiences.

P2
"Accessible, exactly, exactly, exactly. And I think in these days, with this much content creation, even TikTok. Some of these things, they may not all like come out strongly like in, you know, like a **long narrative**. People can **compromise** them if you ask me. It's just, maybe little episodes with little (pause) maybe lessons? Not everybody wants like the whole thing, maybe. Or two episodes. Yeah, that's what I feel."

P1
"[. . .] in academia, there has always been this "OK. Why are you representing this? Are you really doing it for the people represented or is it to show off your ability to do so?". Especially when the product of this is not accessible to the Persons being represented, right? So, I encourage you to make sure that this is something that can be made **accessible to** [...] **your** (stutters) **culture** [...]. There has been a lot of appropriation."

IDNs in Cultural Heritage Preservation This code covers aspects and concerns related to IDNs when compared to traditional digital preservation projects. Mentioned properties include the personal linkage to cultural heritage that can be explored through IDNs and the option to consider different interpretations in the same narrative. Depending on the type of IDN, the need for moderating cross-cultural interactions might also be present.

P1
"With an IDN, we **shift** the **importance** away from that interpretation **to** the **culture heritage** itself. Because we are removing the medium of the interpretation by multitude, [...] that reduces the importance of the singleton- and so shifts the focus away from the telling to the happening."

Use of Environmental Storytelling Regarding the use of environmental storytelling in IDNs, P1 explained the need for state tracking to occur in environments along with the focus on tangible cultural heritage and on spatial exploration.

P1
"it's a choreography of [...] delivery of narrative that is dependent on **spatial exploration** and **engagement** and, again, **dependencies** between the narratives."

The recommendations and approaches suggested in these quotes are critical to successfully applying environmental storytelling in the prototype as they indicate how to design environment and narrative in a technically sound and accessible way for Bukusu locals.

5 Prototype

To put our understandings from the literature review and interview analysis regarding Bukusu oral literature and IDNs into practice and further assess the potential and challenges of environmental storytelling in the digitisation of Indigenous oral traditions, a prototype for an IDN was implemented. Based on a set of Bukusu proverbs provided by Wanzala[59] and Salter's[52] environmental types, a 3D environment was first designed, followed by a set of mechanics, which allow the player to interact with the environment in a way that reveals an underlying narrative related to the oral tradition.

5.1 Design

Inspired by the proposal mentioned by Kimutai et al.[29], multiple proverbs were considered for adaptation into IDNs due to their similarities in superficial themes (e.g. food, animals, forest) and underlying meaning (e.g .friendship, empathy, safety). From a subset of the initally considered proverbs, the following were chosen to be included as mechanics in the IDN prototype:

- **"Okhalia weng'ene tawe."** ("Do not eat alone.")
- **"Sie mumusiru sikhoya wanambwa."** ("That of the forest requires a dog.")
- **"Kumwoyo kwesisa kwakonia engwe khwitikii."** ("A sympathising heart made the leopard spent the night on the veranda of a house."

After choosing the proverbs, a basic forest environment was created in Unity using terrains. The introverted intuitive and introverted thinking environment type were chosen as inspiration for their ability to embed abstract connections between different elements which require outside knowledeg and allow the player to discover mechanics through gameplay respectively. Following that, development took place over the course of four phases:

In the **paper phase**, an initial flow chart depicting all of the interactions available to the player was created. This decision tree was then used to inspire In the **prototype phase**, assets were collected and imported into a Unity project. During the **production phase**, core functionality was implemented before mechanics were revised and simplified. Finally, in the **testing phase**, feedback from a tester was gathered and incorporated into the prototype.

Environment The landscape was designed to invite exploration while also guiding the player to a house which both functions as a place to track progress and as the end of the narrative. In order to that, the house was placed on top of a hill surrounded by a forest. While the player can choose to immediately walk towards the house, the 3D terrain was manipulated to encourage detours. Additionally paths were placed on top of the terrain to suggest the existence of other points of interest. One example of this is a path leading away from the house but towards a smaller hill, on top of which a dog can be found.

Generic forest assets were chosen along with low-poly models of animals and characters. Consistency in art style was compromised due to technical limitations and time constraints. For the asset of the house, the "Luo First Wife's Hut (East Africa) - Medium Poly" model by "LESOStories"[10] was chosen due to its resemblance to Bukusu huts. The dog model is the "dog" model created by user "kylekip"[9]. The audio played in the game is a recording of the Masai Mara national reserve in Southern Kenya and was collected from the "Sounds of the Forest"[51] open source library. Feedback on the environment was collected from a member of the Bukusu tribe.

Mechanics The prototype allows the player to navigate a forest environment where they can encounter fruits, animals, including a dog, leopard and sheep, and interact with a house on top of a hill. Interacting with the house displays a list of Bukusu proverbs the player is encouraged to enact along with corresponding hints written in English and a status indicating whether the player has already enacted the proverb. Once the player has successfully enacted a proverb, which can be done by encountering and interacting with animals and items in the forest, they will be provided with the fully translated proverb in both languages and the proverb will turn green.

As shown in Fig. 2, the following mechanics are present in this prototype:

- **Picking up food**
- **Feeding animals**
- **Encountering animals**
- **Interacting with house**

The set of mechanics were selected to allow the player to deduce the relationships between the proverbs and the environment through discovery. Additionally, hovering over interactable items highlights them with a coloured outline and displays the Kibukusu word for the item. This is done to clarify interactivity to the player and to provide them with additional hints allowing them to fully translate the proverbs into English while also learning Bukusu terms in the process. If done in the right order, the interactant can discover and enact all three proverbs.

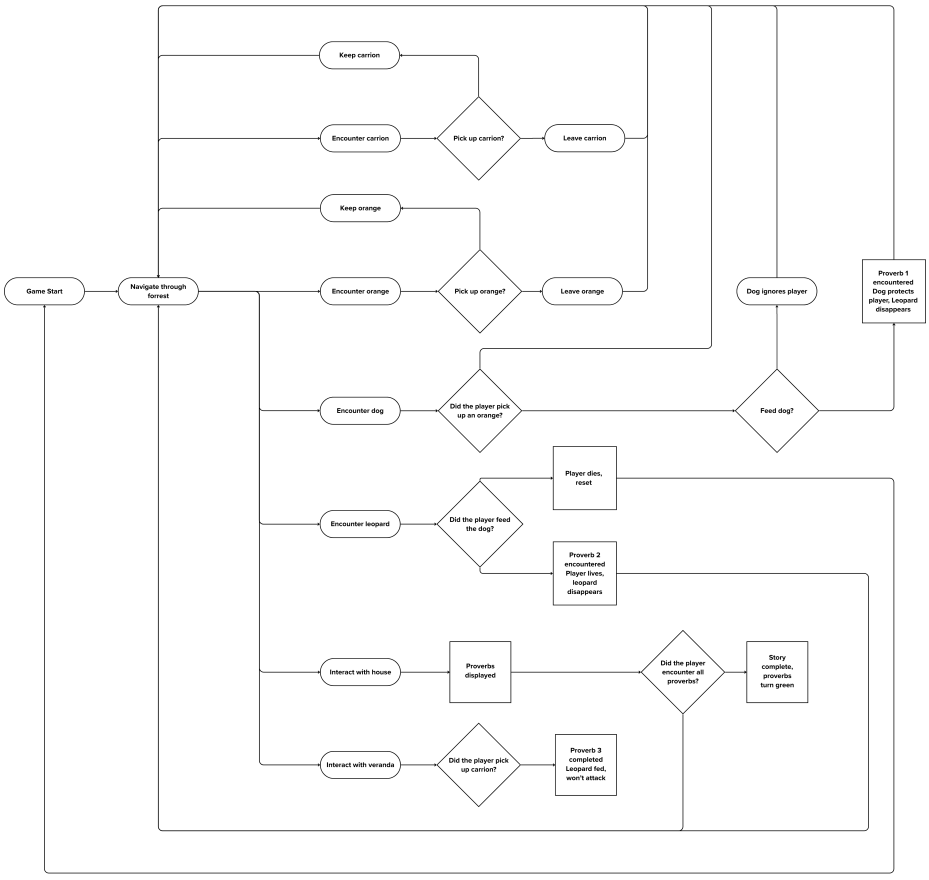

Fig. 2. Flow chart depicting the mechanics of the IDN prototype.

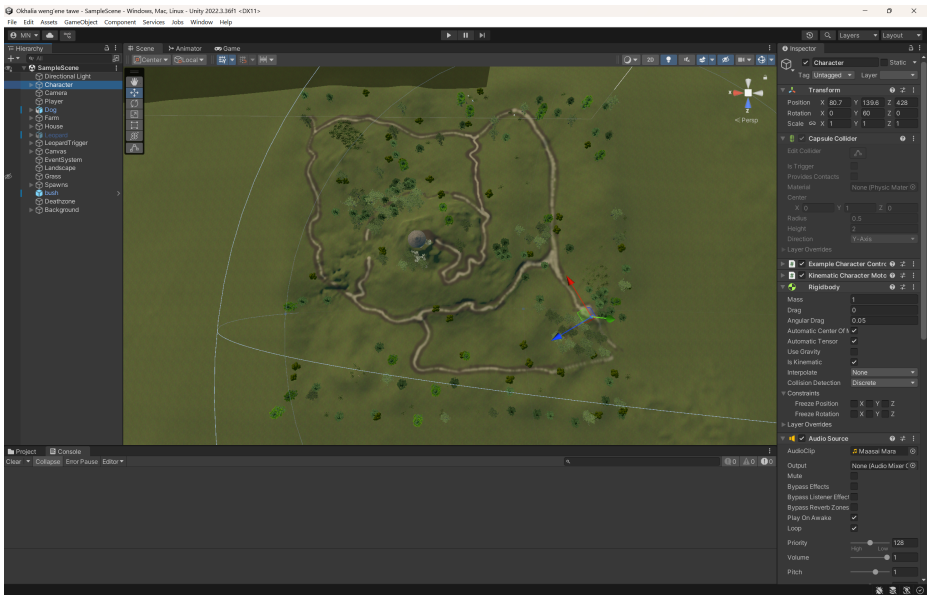

Fig. 3. Terrain of the prototype.

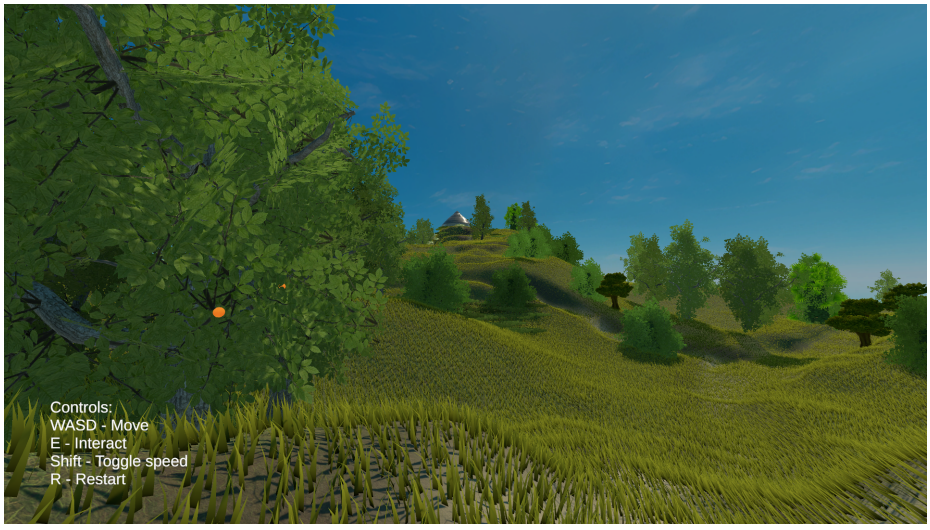

Fig. 4. The house as seen from the starting location of the player.

Fig. 5. Encounter with dog.

Fig. 6. Encounter with farm animals.

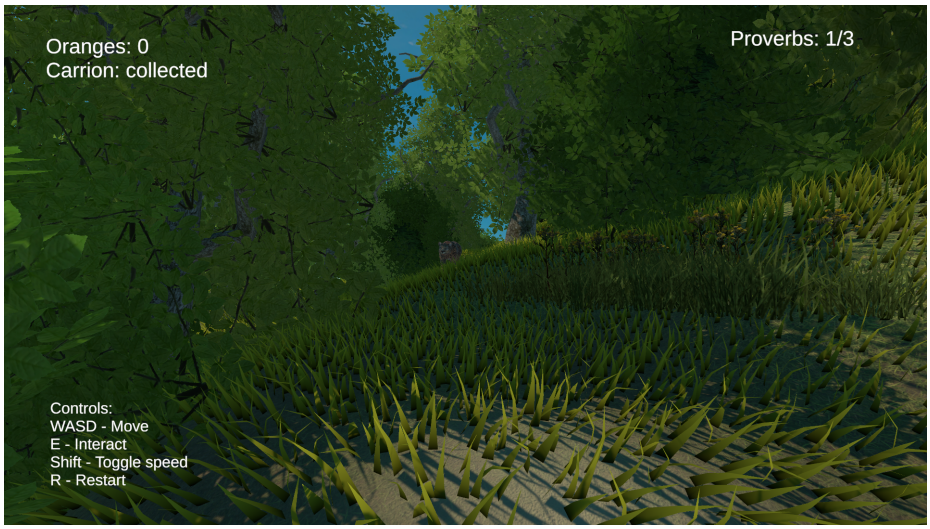

Fig. 7. Encounter with leopard.

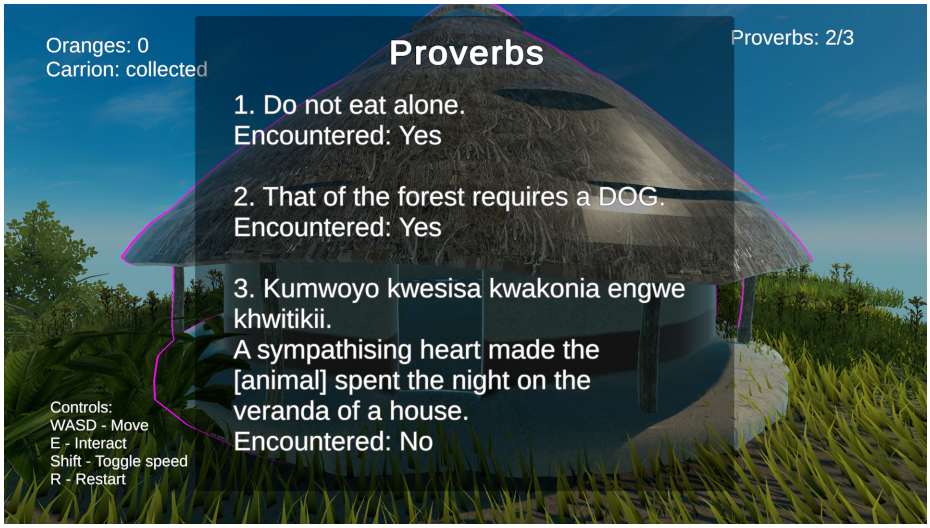

Fig. 8. Reaching the house reveals a list of proverbs which can found in the environment.

6 Discussion

Over the course of the literature review, interview analysis and prototype, we encountered a variety of challenges with regards to digitally preserving Kenyan oral storytelling traditions:

Despite significant developments in environmental storytelling since its introduction in interactive digital media and indexical storytelling, as explained by Fernandez-Vara[19], having found success in popular video games, more contemporary approaches such as archaeological storytelling, proposed by Livingstone et al.[27] have yet to be broadly adopted in educational and entertainment sectors. While environmental storytelling can tell stories with increased immersion for the interactant and inspire mechanics based on the environment, as was mentioned in the interview analysis, challenges related to a lack of resources, accessibility and the challenges posed by cross-cultural research, including the possibility of ignoring sensibilities and creating inauthentic re-tellings of traditional narratives remain. Additionally, while performative responsibilities for the audience are common in both oral and environmental storytelling, translating characteristics the subjectivity and expressions in the narrator's performance into environmental storytelling poses a significant challenge. A deep understanding of the culture and the story's original narrative is required to create immersive environments which can modernize Kenyan oral traditions.

While a variety of different types of IDNs are potentially suited for digitising cultural heritage, we decided to base our approach on Majewski's definition of culture-centric and serious games, which tend to focus on accuracy while still retaining the aim to entertain.

Based on the "Environmental storytelling for Bukusu digitisation" theme of our interview analysis, we find that in the context of cultural heritage preservation, interactive digital narratives have the capacity to remove the focus from a singular perspective to the heritage site itself. This characteristic can be enhanced by specific environmental types, which foster player exploration and interpretation of the story based on remains found in the environment. For instance, extraverted intuitive environments, which are defined in Salter's taxonomy[52], could, through encouraging player exploration, deduction and agency in the storytelling, function as processes in Koenitz's SPP-model, which facilitate highly personalised products in IDNs.

Findings from our literature review and interviews also suggest that while Bukusu proverbs could benefit from the use of IDNs for preservation and modernization, some aspects of oral storytelling remain difficult to digitise. As was pointed out in the "Digitising oral traditions" theme, facets of oral traditions related to the performance of the narration can be lost in the transcription and digitisation process. These findings align with those of Reitmaier et al.[48] on the use of ICT for digitizing oral traditions from African tribes, which explains

that solutions for preserving oral traditions must meet the needs of rural communities and warns of common bias against oral storytelling and for hyper-visual storytelling. Suggestions mentioned in the "Accessibility of Bukusu digitisation projects" code of the same theme, including the video recording of live performances, compressing narratives into a shorter format for online consumption, and creating Kiswahili and English versions of Bukusu narratives, could be considered to preserve oral storytelling traditions in a way that preserves performance while also being accessible to younger generations of locals and members of the diaspora. Similarly, Omari[43] suggests the use of social media for modernizing traditional oral proverbs and Kimutai et al.[29] recommend the use English and Swahili translations.

In the case of our prototype, environmental storytelling was combined with the use of labels written in Kibukusu and English and attached to interactable objects to enhance the accessibility of the narrative to younger people as well as Bukusu locals and members of the diaspora who do not read Kibukusu, but English. At the same time, this measure contributes to the preservation of Kibukusu which was pointed out as needed in the "Understanding Bukusu culture" theme.

Furthermore, we derive that adapting the pacing and structure of oral traditions for the purpose of modernizing them for younger generations is not only worth considering but can contribute to the re-telling of oral literature as the transformation of existing stories into successful IDNs could create additional discourse for Bukusu narratives, similar to the discourse defined Eladhari's[17] model for understanding IDNs. However, when considering how to make cultural heritage from minorities accessible to the wider public, measures for mediating cross-cultural interactions should be taken to avoid culturally insensitive behaviour, as was pointed out in the "IDNs in cultural heritage preservation" code of the "Environmental storytelling for Bukusu digitisation" theme.

Further research could see makers of IDNs exploring the potential of environmental storytelling to highlight underrepresented perspectives on Indigenous narratives from members of multiple marginalized communities.

7 Conclusion

This thesis explored the idea of relying on environmental storytelling to preserve oral traditions from Kenyan Indigenous communities in the form of interactive digital narratives. Findings from our literature review suggest promising results for this use case in the area of archaeological storytelling, in which environments are designed as archaeological sites which can be explored by interactants to learn about cultural heritage. This finding was further confirmed in our interview analysis which suggests that in the context of cultural heritage preservation, environmental storytelling can be useful in the design of IDNs as it produces me-

chanics that are more relevant to the heritage site itself.

As, in the case of the Bukusu and other Kenyan ethno-linguistic minorities, the need for preserving and modernizing oral traditions is given due to the rapid decline of native speakers and lack of accessible content for younger audiences, IDNs might offer an innovative solution to this problem due to their ability to incorporate multiple perspectives, and base immersive interactive narratives on intangible cultural heritage similar to oral traditions. However, embedding storytelling traditions related to tonal variation and gestures into environments poses a significant challenge and sometimes might require the use of alternative forms of storytelling, like, in the case of our prototype, written text. Further work could focus on the abilities of environmental storytelling to highlight intersectional perspectives in IDNs as the makers of digital preservation projects can benefit from their flexibility to both new historical information and novel interpretations.

References

1. Brytenwalda Mod, https://www.brytenwaldastudios.com/mod/
2. Convention C169 - Indigenous and Tribal Peoples Convention, 1989 (No. 169), https://normlex.ilo.org/dyn/nrmlx_en/f?p=NORMLEXPUB:12100:0::NO::P12100_ILO_CODE:C169
3. Curating Simulated Storyworlds - ProQuest, https://www.proquest.com/openview/2b7cb13a72dc4f402a4ebf2f81d815d5/1?pq-origsite=gscholar&cbl=18750&diss=y
4. Environmental Storytelling: Creating Immersive 3D Worlds Using Lessons Learned from the Theme Park Industry, https://www.gamedeveloper.com/design/environmental-storytelling-creating-immersive-3d-worlds-using-lessons-learned-from-the-theme-park-industry
5. Kenya Law: The Constitution of Kenya, https://www.kenyalaw.org/kl/index.php?id=398
6. Never Alone (Kisima Ingitchuna), https://www.neveralonegame.com/never-alone
7. (PDF) Using thematic analysis in psychology, https://www.researchgate.net/publication/235356393_Using_thematic_analysis_in_psychology
8. Popular Verse of the Swahili Tradition on JSTOR, https://www-jstor-org.elib.tcd.ie/stable/1156243
9. dog - Download Free 3D model by neighbor (@kylekip) (Jan 2023), https://sketchfab.com/models/e395f26615ca445ab32f01ded17ff3bf/embed?autostart=1
10. Luo First Wife's Hut (East Africa) - Medium Poly - Download Free 3D model by LESO Stories (@LESOStories) (Apr 2023), https://sketchfab.com/models/f6d93a7d88334717a7131842bb9f6e69/embed?autostart=1
11. 2K Boston, K.A.: BioShock (2007)
12. Ascott, R.: Behaviourist Art and the Cybernetic Vision. Cybernetica, Journal of the International Association for ... (Jan 1967), https://www.academia.edu/740564/Behaviourist_Art_and_the_Cybernetic_Vision

13. Barbara, J., Haahr, M.: Identification and IDNs in the Metaverse: Who Would We Like to Be? In: Vosmeer, M., Holloway-Attaway, L. (eds.) Interactive Storytelling. pp. 601–615. Springer International Publishing, Cham (2022). https://doi.org/10.1007/978-3-031-22298-6_39
14. Bernstein, M., Joyce, M., Levine, D.: Contours of constructive hypertexts. In: Proceedings of the ACM conference on Hypertext. pp. 161–170. ECHT '92, Association for Computing Machinery, New York, NY, USA (Dec 1993). https://doi.org/10.1145/168466.168517, https://dl.acm.org/doi/10.1145/168466.168517
15. Biseko, J.M.: Cultural echoes: linguistic insights into death and afterlife in the Swahili language. Cogent Arts & Humanities **11**(1), 2414608 (Dec 2024). https://doi.org/10.1080/23311983.2024.2414608, https://www.tandfonline.com/doi/full/10.1080/23311983.2024.2414608
16. Core Design, Aspyr, C.D.E.M.S.E.M.: Uncharted (1994)
17. Eladhari, M.P.: Re-Tellings: The Fourth Layer of Narrative as an Instrument for Critique. In: Rouse, R., Koenitz, H., Haahr, M. (eds.) Interactive Storytelling. pp. 65–78. Springer International Publishing, Cham (2018). https://doi.org/10.1007/978-3-030-04028-4_5
18. Entertainment, T.: Mount Blade: Warband (2010)
19. Fernandez-Vara, C.: Game Spaces Speak Volumes: Indexical Storytelling. MIT web domain (Jan 2011), https://dspace.mit.edu/handle/1721.1/100274, accepted: 2015-12-15T20:03:05Z Publisher: Digital Games Research Association
20. FromSoftware: Demon's Souls (2009)
21. Games, U.O.: Never Alone (2014)
22. Haahr, M., Barbara, J.: Virtual Reality Interactive Narratives in Transmedia Cultural Heritage Experiences. Maastricht University, Netherlands (2021), https://www.tara.tcd.ie/handle/2262/101319, accepted: 2022-10-05T15:07:50Z Journal Abbreviation: International Conference of Terra Mosana: Sustainable Digital Heritage
23. Henley, S.: Skabma - Snowfall Interview: Bringing Sámi Culture Into The Spotlight (Oct 2021), https://www.thegamer.com/skabma-snowfall-interview-sami-culture/, section: TheGamer Originals
24. Higgins, J.: Janet H. Murray, Hamlet on the Holodeck: The Future of Narrative in Cyberspace (New York: The Free Press, 1997), 324 pp. ISBN 0-684-82723-9. Convergence **4**(4), 128–130 (Dec 1998). https://doi.org/10.1177/135485659800400413, https://doi.org/10.1177/135485659800400413, publisher: SAGE Publications Ltd
25. Holtorf, C.: From Stonehenge to Las Vegas : archaeology as popular culture. Walnut Creek, CA : Altamira Press (2005), http://archive.org/details/fromstonehengeto0000holt
26. Jaakkola, J.J.K., Juntunen, S., Näkkäläjärvi, K.: The Holistic Effects of Climate Change on the Culture, Well-Being, and Health of the Saami, the Only Indigenous People in the European Union. Current Environmental Health Reports **5**(4), 401–417 (Dec 2018). https://doi.org/10.1007/s40572-018-0211-2, https://doi.org/10.1007/s40572-018-0211-2
27. Jeffrey, S.: Archaeological Storytelling in Games (Jan 2016), https://www.academia.edu/119012863/Archaeological_Storytelling_in_Games
28. Joyce, S.: Authentic-Deconstructionist Games and Tragic Historiography in Assassin's Creed III. American Literature **94**(1), 133–158 (Mar 2022). https://doi.org/10.1215/00029831-9697029, https://doi.org/10.1215/00029831-9697029

29. Kimutai, M., Awuor, F.M., Kogeda, O., Kimeli, K.: Ethnocomputing: Using ICT to Preserve the Culture of the People of North-Rift Region of Kenya. International Journal of Scientific Research in Knowledge **2**, 199–207 (Apr 2014). https://doi.org/10.12983/ijsrk-2014-p0199-0207
30. Koenitz, H.: Towards a Theoretical Framework for Interactive Digital Narrative. In: Aylett, R., Lim, M.Y., Louchart, S., Petta, P., Riedl, M. (eds.) Interactive Storytelling. pp. 176–185. Springer, Berlin, Heidelberg (2010). https://doi.org/10.1007/978-3-642-16638-9_22
31. Koenitz, H.: Design Approaches for Interactive Digital Narrative. In: Schoenau-Fog, H., Bruni, L.E., Louchart, S., Baceviciute, S. (eds.) Interactive Storytelling. pp. 50–57. Springer International Publishing, Cham (2015). https://doi.org/10.1007/978-3-319-27036-4_5
32. Koenitz, H., Ferri, G., Haahr, M., Sezen, D., Sezen, T. (eds.): Interactive Digital Narrative: History, Theory and Practice. Routledge, New York (Apr 2015). https://doi.org/10.4324/9781315769189
33. Majewski, J.: Cultural Heritage in Role-Playing Video Games: A Map of Approaches. Furnace journal, issue 2 (Jan 2015), https://www.academia.edu/16673904/Cultural_Heritage_in_Role_Playing_Video_Games_A_Map_of_Approaches
34. Mateas, M.: A preliminary poetics for interactive drama and games. Digital Creativity **12**(3), 140–152 (Sep 2001). https://doi.org/10.1076/digc.12.3.140.3224, https://doi.org/10.1076/digc.12.3.140.3224, publisher: CAA Website _eprint: https://doi.org/10.1076/digc.12.3.140.3224
35. Mbele, J.L.: Wimbo wa Miti: An Example of Swahili Women's Poetry. African Languages and Cultures **9**(1), 71–82 (1996), https://www.jstor.org/stable/1771793, publisher: Taylor & Francis, Ltd.
36. Mol, E.b.A.A.A., Ariese, C.E., Politopoulos, K.H.J.B..A.: The Interactive Past. Archaeology, Heritage, and Video Games (May 2017), https://www.sidestone.com/books/the-interactive-past
37. Montreal, U.: Assassin's Creed III (2012)
38. Mortara, M., Catalano, C.E., Bellotti, F., Fiucci, G., Houry-Panchetti, M., Petridis, P.: Learning cultural heritage by serious games. Journal of Cultural Heritage **15**(3), 318–325 (May 2014). https://doi.org/10.1016/j.culher.2013.04.004, https://www.sciencedirect.com/science/article/pii/S1296207413001349
39. Naeem, M., Ozuem, W., Howell, K., Ranfagni, S.: A Step-by-Step Process of Thematic Analysis to Develop a Conceptual Model in Qualitative Research. International Journal of Qualitative Methods **22**, 16094069231205789 (Jan 2023). https://doi.org/10.1177/16094069231205789, https://doi.org/10.1177/16094069231205789, publisher: SAGE Publications Inc
40. Naughty Dog, Bend Studio, O.L.G.B.G.P.I.G.: Uncharted (2007)
41. Ntarangwi, M.: Music, identity and Swahili Networks of knowledge. pp. 7–26 (Jan 2008)
42. Nyanchoka, L., Tudur-Smith, C., Porcher, R., Hren, D.: Key stakeholders' perspectives and experiences with defining, identifying and displaying gaps in health research: a qualitative study protocol. BMJ open **9**(8), e027926 (Sep 2019). https://doi.org/10.1136/bmjopen-2018-027926
43. Object, o.: Swahili modern proverbs: the role of literary writers and social network users https://core.ac.uk/reader/226120940
44. Odhiambo Makoloo, M.: Kenya: Minorities, Indigenous Peoples and Ethnic Diversity (Apr 2005), https://minorityrights.org/resources/kenya-minorities-indigenous-peoples-and-ethnic-diversity/

45. Pearce, C.: narraTIVe enVIronmenTS from disneyland to World of Warcraft (2007), https://www.semanticscholar.org/paper/narraTIVe-enVIronmenTS-from-disneyland-to-World-of-Pearce/3cde6ce1d4aae109a23e68e80d0cb056544d1f41
46. Productions, M.: Middle-earth: Shadow of Mordor (2014)
47. Reinhard, A.: Archaeogaming: An Introduction to Archaeology in and of Video Games. Berghahn Books, 1 edn. (2018). https://doi.org/10.2307/j.ctvw04bb5, https://www.jstor.org/stable/j.ctvw04bb5
48. Reitmaier, T., Bidwell, N.J., Marsden, G.: Situating digital storytelling within African communities. International Journal of Human-Computer Studies **69**(10), 658–668 (Sep 2011). https://doi.org/10.1016/j.ijhcs.2010.12.008, https://www.sciencedirect.com/science/article/pii/S1071581910001655
49. Rizvic, S., Boskovic, D., Mijatovic, B.: Advanced interactive digital storytelling in digital heritage applications. Digital Applications in Archaeology and Cultural Heritage **33**, e00334 (Jun 2024). https://doi.org/10.1016/j.daach.2024.e00334, https://www.sciencedirect.com/science/article/pii/S2212054824000195
50. Roth, C., Koenitz, H.: Evaluating the User Experience of Interactive Digital Narrative (Oct 2016). https://doi.org/10.1145/2983298.2983302
51. Rumpus, W.: Sounds of the Forest - Soundmap :: Timber Festival, https://timberfestival.org.uk/soundsoftheforest-soundmap/
52. Salter, D.: Revisiting the taxonomy of environmental types and introducing the Salter Environmental Type Assessment. Journal of Psychological Type **62**, 55–66 (Jan 2003)
53. Smith, O.: Interview: Skábma Devs Talk Authentic Representation Of Indigenous Cultures (Apr 2022), https://www.gamebyte.com/interview-skabma-snowfall/
54. Somjee, S.H.: Oral Traditions and Material Culture: An East Africa Experience. Research in African Literatures **31**(4), 97–103 (2000), https://www.jstor.org/stable/3821080, publisher: Indiana University Press
55. Stavenhagen, R., UN. Human Rights Council. Special Rapporteur on Rights of Indigenous Peoples (eds.): Report of the Special Rapporteur on the Situation of Human Rights and Fundamental Freedoms of Indigenous People, Rodolfo Stavenhagen. UN, Geneva, https://digitallibrary.un.org/record/596174
56. Sylvain, R.: Indigenous Peoples in Africa. In: Oxford Research Encyclopedia of African History (Dec 2017). https://doi.org/10.1093/acrefore/9780190277734.013.263, https://oxfordre.com/africanhistory/display/10.1093/acrefore/9780190277734.001.0001/acrefore-9780190277734-e-263
57. Valve: Portal (2007)
58. Vierke, C.: Of Plants and Women. A Working Edition of Two Swahili Plant POEMS1. SWAHILI FORUM (Jan 2007), https://www.academia.edu/97562401/Of_Plants_and_Women_A_Working_Edition_of_Two_Swahili_Plant_POEMS1
59. Wanzala, W., Iminza, M., Khaemba, W.: Some of the commonly used Bukusu Proverbs and their Literal Meanings in the Society. Journal of Natural & Ayurvedic Medicine **7**, 16 (Nov 2023). https://doi.org/10.23880/jonam-16000421
60. Weaver, H.N.: Indigenous Identity: What Is It, and Who Really Has It? American Indian Quarterly **25**(2), 240–255 (2001), https://www.jstor.org/stable/1185952, publisher: University of Nebraska Press
61. Weng'ua, F.: Use of Information Communication Technologies in managing and preservation of Bukusu indigenous knowledge. p. 513 (Jul 2024)
62. Wiener, N.: Cybernetics or Control and Communication in the Animal and the Machine, Reissue of the 1961 second edition. MIT Press (Oct 2019)

A Interview Questions

A.1 Background

1. Could you tell me about your work, and what you do?
   (a) What does it involve?

2. Do you have experience with preserving cultural heritage?

3. Do you have experience with environmental storytelling?

A.2 Defining Environmental Storytelling

4. How would you describe the term "environmental storytelling" in your own words?
   (a) (Research) Can you walk me through how you consider environmental storytelling or spatial design when working on interactive digital narratives?
      i. How much consideration goes into it?

      ii. In the case of educational games, are there special considerations for storytelling?

   (b) (Education) Would you say that you use environmental storytelling when educating on oral traditions?
      i. What is the importance of environmental storytelling in your day-to-day work?

A.3 Experiences, Knowledge and Perceived Needs with Methods Used to Preserve Oral Traditions

5. Could you talk about your views/any experience you have in preserving oral traditions?
   (a) (Research) For example, how would you decide on a storytelling method for virtually preserving an oral tradition?
      i. If so, do you have a preferred method?

      ii. If not, how do you have any views on using storytelling to preserve intangible cultural heritage (knowledge/art/ideologies/beliefs) in general?

   (b) (Education) For example, how would you educate students on oral traditions or storytelling methods?

   (c) (Education) Do you have experience with using interactive digital narratives for this purpose?
      i. If not, which digital tools have you used for educating students on oral traditions/cultural heritage?

6. Could you tell me more specifically about the methods you use to preserve oral traditions/ intangible cultural heritage?
   (a) What are some of the strengths of the method(s)/ practices you used?
   (b) What are some of the challenges you experienced using the methods/practices?
7. Looking back on your experience using methods of preserving oral traditions/cultural heritage, what is needed to improve the methods you used to preserve oral traditions/cultural heritage?
   (a) (Research) How could IDN's be improved to support educating users on cultural heritage?
   (b) (Education) What are current challenges in digitally preserving Swahili oral storytelling traditions for Diaspora communities?
   (c) (Education) What would you expect from digital tools to support you in educating students on the matter?
8. Do you consider environmental storytelling to be a viable primary tool for preserving oral traditions digitally?
   (a) Can environmental storytelling replace performative aspects found in oral storytelling traditions such as physical or vocal performances?

A.4 Experiences, Knowledge, Perceived Needs and Opinions Related to the Ethics of Educating and Entertaining with Cultural Heritage

1. Could you describe any experience you have in balancing education with entertainment in preserving cultural heritage?
2. Based on your experience, what are some ethical considerations you take when finding a balance between preserving traditions and creating an immersive, accessible interactive experience?
   (a) How would you decide on whether entertainment or accuracy in education should be prioritized?

A.5 General Follow-up Questions

1. Do you have any additional thoughts you would like to share?