The White Earth Digital Tribal Museum: Creation of an Open-Access Online Museum Using 3D Images of Cultural Heritage Objects

By

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Abstract

Barriers like financial constraints and travel logistics prevent Indigenous people from accessing their cultural heritage objects held by national, state, and local institutions. This can be overcome using photogrammetry to create 3D models of cultural heritage objects and housing them in virtual museums accessible via Internet-capable devices. This pilot project, working with the White Earth Band of Ojibwe on the White Earth Reservation in Minnesota, followed appropriate museology and communities of practice approaches to meet the concerns, desires, and budget of the tribal members to provide them unfettered access to cultural heritage objects. Because this approach presents cultural objects as 3D models, which can be 'manipulated' as if physically held, it offers visitors more meaningful engagement than they would have with single-dimension, restricted access museum displays. This project focusing on ten cultural heritage objects serves as a foundation on which similar digital museum projects initiated by Indigenous communities can build.

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Throughout my academic career at the University of Manitoba, and this thesis process, I have been very fortunate to have an advisor who has been just as excited about this work as I have been. Many thanks are owed to Dr. S. Brooke Milne for her shared passion, unending patience, and for providing moments of clarity during this project, as well as my thesis committee members, Drs. Kathleen Buddle and Shelley Sweeney.

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I certainly wouldn't have made it to this point without the unwavering support of my immediate family, especially my mother, who encouraged and pushed me to always reach higher and speak the truth for our people.

Finally, without the use of the Autodesk© 123D® Catch and Sketchfab© programs, this project would not have been possible.

Dedication

During this project, many life-changing events have occurred that have not only changed me, but also the outcome of my research and the world around me. First and foremost, I dedicate this project to the water protectors at Standing Rock (and around the world) and their continued fight against police brutality and militarization for clean water. Having been out to the camp and seen firsthand what is happening, it has made this project that much more important in my eyes: to present the truth—from a historical perspective—from an Indigenous voice rather than a colonial one. Decolonization and cultural sovereignty are ongoing battles, and I hope that I have helped to bring us one small step closer to those goals.

Many years ago, I was fortunate enough to be introduced to a wonderful couple who would become very important to me as elders, mentors, and grandparents. Andy and Mary Favorite, White Earth Band members, were very inspiring to me and my decision to carry out this project with White Earth. Unfortunately, Andy walked on less than a year after having met him. Mary and I became very close, often speaking on the phone or online, meeting up at powwows and community events, and having lunch together. During this project, Mary was diagnosed with cancer and struggled with the disease; despite her own condition, she was always extremely supportive of me and my work. Unfortunately, before this project could be completed, Mary also walked on. To the Favorites, whom I owe more than I can put into words, I dedicate this project.

To the voiceless, the stolen, but the never forgotten: I dedicate this project to the many missing and murdered Indigenous women, men, and two spirit who have been taken from us and never found. Your stories will be told; your voices will be heard.

Lastly, I dedicate this project to my uncle Dean Swetland. Many late nights eating fast food and telling jokes will always be some of my favorite memories.

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Chapter 1: Introduction

Cultural heritage objects and research conducted on them by non-Indigenous scholars can be contentious for Indigenous communities (Cambra 1999; Colwell 2014; Deloria Jr. 1988; Magubane 2009; Silverman 2009). Often, anthropologists entering a community for research purposes are viewed by the people as agents of colonization, because "at heart, archaeology is a colonialist endeavour" (Smith and Wobst 2005:5). In the settlement era, colonizing powers have used anthropologists to gather information about Indigenous people; this power imbalance meant that Indigenous peoples had no control over what information was gathered or how it was interpreted (although there are some instances where Indigenous community members sought the assistance of anthropologists for their own agendas, such as Shingwaukonse (Shingwauk Kinoomaage Gamig, 2017)). Barrett (2015:143), on the origin of the modern museum, indicates that: "By the middle of the nineteenth century, the emerging modern public museums were a vital part of industrialization and colonial processes." Museums served as a looking glass for the majority to see who and what they now controlled. When it comes to the colonization of North America, "Notions about the "primitive" nature of Indian society influenced what was collected and how it was displayed" (Sleeper-Smith 2009:2). Because non-Indigenous researchers piloted these acquisitions, the information they provided to the viewing public was usually inaccurate or even flat out wrong. "Many representations that have been created within museums and through the lens of colonialism have been very damaging for Indigenous peoples, such as perpetuating the vanishing Indian of the past" (Fischer-Olson 2014:4). In fact, "the discursive power wielded by the colonizers granted them license to determine the orientation, content, interpretation, and diction" (de Ramirez 2007:vii) of the writings and exhibitions pertaining to Indigenous peoples.

The collection of Indigenous culture in colonized lands included not only information, but also things, which could be brought back to Europe and displayed for the public sphere[1]. "Many museums possess objects that escape Western categories of commodities—that were in fact collected precisely because of their perceived difference—that are believed by some to be akin to living beings, instilled with agency and filled with preternatural power" (Colwell 2014:11). This idea that objects, especially those made specifically for ceremony, are living beings meant that this collection of artifacts by non-Indigenous powers over the centuries is not simply the theft of objects, but is considered something closer to kidnapping: "The very act of acquisition—trade, purchase, donation—is a process of objectification in the most literal sense" (Colwell 2014:15). These actions divorced the communities where objects were stolen from, from their ceremonies and the spirits necessary to carry them out. Although communities may have experienced these atrocities hundreds of years ago, the historical trauma remains. "The removal of objects and religious persecution…has created a "spiritual imbalance" that can be restored through the return of stolen objects" (Colwell 2014:13).

In Colwell's work with the Zuni, he indicates that "Between 1879 and 1884 alone, cultural artifacts were taken at a rate of five objects for every occupant of Pueblo; many were taken under the cover of dark" (2014:13). This kind of theft was not uncommon for Indigenous communities throughout North America, who quickly found their material culture to be commodified by art collectors, museum curators, and anthropologists often with neither their consent nor compensation. While many early anthropologists justified their work as

[1] In this thesis, public sphere refers to the primarily non-Indigenous, paying visitors to museums, while constituents refers to the Indigenous community members or stakeholders. This distinction is laid out by Barrett (2011, 2015) and Schorch and Hakiwai (2014) as it relates to the 'new museology' movement, indicating that Indigenous museums are a place for postcolonial thought that helps to bring these two distinct museum-goers together in one forum and challenging Western ways of thinking.

'preservation', they unfortunately served to do more damage than good. Objects would be taken, transported to major institutions in large cities for curation, and then displayed for a curious audience of non-Indigenous people. However, "institutions ultimately distort cultural understanding rather than promote it" (Colwell 2014:14).

Perhaps the most inappropriate exhibitions to come out of the Industrial Revolution were ethnographic showcases, a sort of 'living exhibition' of Indigenous peoples from around the world. "Ethnographic showcases were the equivalent of human zoos wherein Indigenous people were exhibited for the amusement of the English viewing public and for the profitability of show owners and exhibitors as well as to satisfy the evidentiary needs of ethnographers and anthropologists" (Magubane 2009:45). While it may seem that ethnographic showcases may have served the scientific community well to some extent, this display of living Indigenous people, forcibly taken from their lands and communities, often served a much more sinister purpose, not only encouraging "viewers to revel in their racial superiority; they also invited ordinary English people to imagine themselves as colonial overlords" (Magubane 2009:49).

This history of theft and display of cultural material heritage not only interrupted the cultural practices for hundreds of Indigenous nations in North America (and around the world), it also set the framework for a future of inaccurate cultural representations and cultural appropriation that continues today. Sleeper-Smith (2009:1) indicates that:

> Consequently, because Indigenous peoples did not possess a collective vision of themselves, the idea of the *Indian* or *Indians* emerged as a white image or stereotype. Indians became a single entity for the purposes of description and analysis. Simultaneously, by categorizing all Indigenous peoples as Indians, the newcomers downplayed the differences between Indigenous peoples, leading to a centuries-long confusion and a melding of fundamentally incorrect ways of understanding human societies.

This problem is being addressed today through various cultural reclamation projects like language revitalization (e.g. the Bug-O-Nay-Ge-Shig language immersion school on the Leech Lake Reservation in Minnesota), traditional camps (e.g. ricing, berry picking, fishing, hunting), and culture camps that teach traditional activities like lacrosse (e.g. the Creator's or Maker's Game), drumming and singing, dancing, and traditional crafts (e.g. regalia making, dreamcatcher weaving, beadwork, quillwork, featherwork, weaving).

Despite the contemporary collaborative efforts employed by many anthropologists (Colwell 2014; Dawson and Levy 2006; Dawson, Levy, and Lyons 2011; Levi and Dawson 2006; Fischer-Olson 2014; Schorch and Hakiwai 2014), descendant communities still harbor a certain amount of distrust towards researchers. I believe tribal nations can utilize this work as a means of decolonization and regaining cultural sovereignty by reclaiming control of their cultural heritage and its interpretations.

1.1 Statement of Research Objectives

In order to facilitate cultural and historical reclamation for Indigenous people, removing the barriers to access that these communities face is the first step. I suggest that this pilot project accomplishes this goal: by removing the barriers to access that the members of the White Earth Nation face in interacting with their cultural material heritage, they can regain control of this information and utilize it as a means to decolonize. This decolonization allows them to deconstruct the meaning attached to these objects by collectors and anthropologists, and to create new meanings with cultural relevance.

In this thesis, I propose that this project presents a more accurate and effective presentation of tribal cultural heritage than current museum approaches for two reasons: 1) utilizing 3D surrogates preserves the spirit and integrity of objects by allowing digital manipulation of the object; and 2) incorporating voices from the community to include oral history and Anishinaabe language will create personal connections with community members that standard approaches fail to do. The concept of digital surrogates is best explained by Mudge, Ashley, and Schroer (2006:1):

> Their goal is to reliably represent 'real world' content in a digital form. Their purpose is to enable scientific study and personal enjoyment without the need for direct physical experience of the object or place. Their essential scientific nature distinguishes them from speculative digital representations.

This project has three main objectives: (1) creating digital surrogates of complete cultural heritage objects in the tribal collections of the White Earth Band of Ojibwe for preservation purposes; (2) providing easier access to cultural heritage for band members, educators, and interested members of the public; and, (3) facilitating traditional oral history and oral teaching methods from elders in a format that the younger generation is more familiar with.

By applying the communities of practice and appropriate museology frameworks to my research, I have carried out this project in a way that is easily replicable (requiring little training or prior knowledge), cost-effective (able to be undertaken with minimal budgetary considerations), addresses the concerns of community members (by removing barriers to access), and meets their needs for cultural heritage reclamation (by including them in the planning and implementation stages).

Central to this work is the idea of cultural sovereignty, which has been referred to "as a means by which Native peoples can constitute their own histories and identities in a manner

which, among other things, will counterbalance the false images that have been presented as truth by non-Natives" (Coffey and Tsosie 2001:200). By playing an active role in how our history is displayed (via cultural heritage objects in this project), we are 'setting the record straight' and repatriating our own traditional ways of knowing and living. A firm foundation in cultural sovereignty sets a path for political sovereignty, a continual struggle between Indigenous nations and the federal government.

The community that I am working with for this project is the White Earth Band of Ojibwe, located on the White Earth Reservation in North-Central Minnesota, USA. In America, terms such as American Indian, Native American or, pejoratively, just Indian, are used to describe these communities. In Canada, the terms aboriginal, First Nations, and Indigenous are used. For this project, I rely on the term Indigenous when discussing the people from these communities, as it is cross-culturally accepted not only in North America, but also around the world to refer to any group of people who originally inhabited an area (quotes may contain other terms depending on the author). This term adheres to the practice of the United Nations, specifically the 2007 United Nations Declaration on the Rights of Indigenous Peoples (United Nations 2007). I also use this term because it does not rely on a specific geographic location (*American* Indian) nor does it question the legitimacy of creation stories (*aboriginal*). For this project, I will also refer to the White Earth Nation as a reservation, as this is the common term in America, compared to the use of 'reserve' in Canada.

I believe the outcome of this project will serve as a foundation piece in the work of cultural sovereignty, allowing Indigenous nations to take control of their history and present it in a way that is more functional to their people. By doing so, it also makes that history available to outsiders in a way that the Indigenous nations are more comfortable with, as it tells their truths

rather than those perpetuated by outsiders (e.g. anthropologists, archaeologists, sociologists, historians). As Coffey and Tsosie (2001:200) point out, "not surprisingly, the histories that have been constructed about Native people are often inaccurate and have been used to justify the dispossession of Native peoples from their lands, resources, and even their cultural identity". For this to change, it must be initiated from within the Indigenous nations. This project is, therefore, set up in a way that allows it to be easily replicated so that Indigenous nations all over the world can utilize it as a means of decolonization and regaining cultural sovereignty.

When there are so many traditional brick and mortar museums, one may question the need for a virtual museum, as suggested and created in this project. Cultural heritage objects should not only be accessible to stakeholders, but should be preserved at the same time. Through the creation of 3D models and virtual museums, the two are no longer mutually exclusive. "Especially in the case of artefacts prone to decay and harm caused by environmental factors such as lighting, noise, temperature, humidity, or pollution, a virtual display might be the only way to preserve and share these assets at the same time" (Ozman and Balcisoy 2007:2)

1.2 Context of Research

With 3D image creation, viewing, and display technology continuing to be updated to meet the needs of a variety of concerns and users, its applications are expanding (e.g. Beraldin et al. 2001; Chen, Yen and Yang 2009; El-Hakim 2000; Mudge et al. 2010; Ozman and Balcisoy 2007; Payne 2012; Taylor and Beraldin 2001; Tsirliganis e al. 2001, 2004). Utilizing 3D objects to meet the needs of Indigenous communities is not a new idea (Corcoran et al. 2002; Dawson and Levy 2004; Dawson, Levy, and Lyons 2011; Isler, Wilson, and Bajcsy 2006; Levy and Dawson 2006) but the way in which it is proposed in this project is. The relationship that can be

fostered through the interaction of historic cultural heritage objects and contemporary communities can only be a positive step towards cultural revitalization and preservation.

1.2.1 Accessibility of Cultural Heritage

Despite the growing number of museums found all over North America, ranging from large exhibitions at federal institutions such as the National Museum of the American Indian in Washington, DC, to smaller examples such as the Beltrami County Historical Society in Bemidji, Minnesota, Indigenous people continue to encounter barriers to accessing these places. Bourdieu and Darble (1990, as cited in Barrett 2015:144) argue:

> …museums, particularly art museums, purport to be accessible to all, but are not accessible to the working classes. According to these authors, even if there is no admission charge to enter, attendance is voluntary and working-class people do not have the cultural capital to feel comfortable in these spaces or to understand how to decode the objects.

According to a 2013 Legislative testimony given by former Chairwoman Erma Vizenor, 79.7% of the White Earth Nation population falls below the poverty line; White Earth is also the most economically poor reservation in the state of Minnesota (Vizenor 2013:1). This financial hardship faced by White Earth Band members alone is a major barrier to access, as most families struggle to provide basic necessities to themselves and family members. If a situation arose where band members could access a museum without an admission fee, the next barrier would be transportation. White Earth 477 Program, a provision of Public Law 102-477, provides supportive services in regards to transportation for those seeking work or currently employed; these services include "title transfer fees, car insurance, gas, bus passes and car repair" (Lhotka 2014:1). Beyond the provisions of the 477 Program, band members do not receive assistance with personal transportation; transportation services are provided free of charge to band members

within the reservation boundaries for healthcare, attending meetings at the government offices, and getting to and from school. Transportation off-reservation is only available through personal vehicles, a luxury many band members do not have. Supposing that transportation were no longer a barrier, the hours of operation that museums maintain presents another barrier. For band members who are fortunate enough to have a job, it is difficult to visit a museum that is only open during your work hours; taking time off to visit would create financial hardship. Along with these operating hours, museums often have a 'gatekeeper' in the form of a fee collector.

Were all of these barriers to be removed, a final barrier would remain: only those cultural heritage objects that have been curated for a particular exhibition are on display and accessible. While some locations will allow stakeholders access to collections in storage, most places have specific requirements, as Barrett (2015:144) explains: "The full collection was available to specialist researchers to conduct scientific inquiry." Access to cultural heritage objects is often restricted to researchers with the proper credentials, which can many times exclude members of descendant communities who wish to connect to their ancestors' physical objects. In the cases where members of descendant communities can access these objects, often in the possession of non-tribal entities, access is restricted and closely regulated in a way that does not suit Indigenous cultural expectations for being able to access these items. The simple fact that most cultural heritage objects are stored in boxes on shelves in storage facilities creates much discontent for Indigenous people who feel these items should be returned to their place in Mother Earth. Rosemary Cambra (1999) recounts her experience as an Ohlone/Costanoan woman fighting for repatriation of cultural heritage objects and human remains in the 1980s in California; after years of letter writing and attending city council meetings, she finally achieved

the repatriation of remains from Stanford University. Following that, after she and several other descendants laid 360 ancestors to rest, she explained her feelings: "Now we gave a final life to them by putting them back to rest where they belonged" (Cambra 1999:429).

Despite the National Historic Preservation Act (NHPA) being passed in 1966, it would be 30 years before any provisions were in place for Tribal Historic Preservation Offices (THPO). With the passing of the Native American Graves Protection and Repatriation Act (NAGPRA) in 1990, Indigenous nations were first able to legally reclaim cultural heritage objects from federal institutions, but only if they met certain criteria (25 USC Chapter 32). Prior to the enactment of the Native American Graves Protection and Repatriation Act (NAGPRA) in 1990, Indigenous cultural heritage was often removed from its resting place in Mother Earth and taken to universities and museums for scientific study (Cambra 1999; Colwell 2014). NAGPRA ensured that restrictions were placed on what type of site could legally be disturbed and which cultural heritage objects could be removed from their *in-situ* context. It also required that federally funded institutions repatriate sacred objects, burial associated objects, and human remains that had been excavated prior to 1990, when they could be culturally associated. However, all other objects could remain in the collections of these institutions, despite requests from Indigenous communities who wished to have their cultural heritage returned. NHPA was amended in 1992 to allow for an increased participatory role of tribal nations in cultural preservation programs. In 1996, tribal nations began entering into agreements with the National Park Service to create the THPO programs, building on the 1992 amendments ("Historic Preservation Laws, Executive Orders, and Regulations"). Despite this legislation, many Indigenous nations find they lack the necessary resources, storage capabilities, available collections, and employees to successfully operate a Tribal Historic Preservation Office. Only 20 years have passed since the THPO

programs were created, citing the true beginning of collaboration in preservation between federal institutions and tribal nations. This means that tribal nations have only had these last 20 years to work towards being able to obtain, preserve, and display cultural heritage objects in a way that competes with institutions that have had decades to centuries to do the same thing (the George Gustav Heye Museum of the American Indian, the Smithsonian, the Field Museum, etc.). Post-NAGPRA (i.e. 1990-present), there was a shift in who conducted archaeological investigations on tribal lands. Many of these excavations are now undertaken and overseen by Indigenous nations via their Tribal Historic Preservation Officers (usually a band member, but sometimes the THPO is an outsider with the proper credentials and may have no Indigenous heritage) and cultural heritage objects are mostly now kept in the possession of the band. While this is a step in the right direction, these recent changes account for only a small portion of the Indigenous cultural heritage that has been discovered during archaeological investigations and, therefore, tribal collections house only a fraction of a group's cultural heritage objects. Investigations conducted on reservation are still subject to oversight from the State Historic Preservation Office (SHPO, a state entity similar to the THPO), while those occurring anywhere else in the state may be overseen by the SHPO, universities, or federal crews through the Bureau of Land Management (BLM).

1.2.2 White Earth Nation

As the largest reservation in Minnesota (according both to enrollment numbers and geographic area), White Earth covers 1,093 miles squared (as shown in Figure 1). The reservation is a provision of the "1855 Treaty with the Chippewa" (Kappler 1904) and is home to the Mississippi and Pillager bands of Anishinaabe. To travel from the extreme northeast corner

of the reservation to the location of the tribal council offices and the building where cultural heritage objects are stored is approximately 56.5 miles; this is only possible if one has a vehicle, can secure a reliable ride, or undertakes to hitch-hike (which is a daily occurrence). For many band members living on the reservation, vehicles may be shared by many family members and may only be available for essential trips such as medical needs, purchasing groceries, and transportation to work or school. Accessing cultural heritage objects is often the last thought on many band members' minds and rarely constitutes an occasion for securing a ride. However, many band members have computers in their homes with Internet access. For those who do not, local community centers have computer stations with Internet access that band members can use when the centers are open—these are often within a few miles walking distance. The creation of this virtual museum provides greater accessibility to the cultural heritage housed within the government building for band members. These virtual museums also support 'eco-citizen activism' by eliminating the use of fossil-fueled vehicles being driven to physical museum locations.

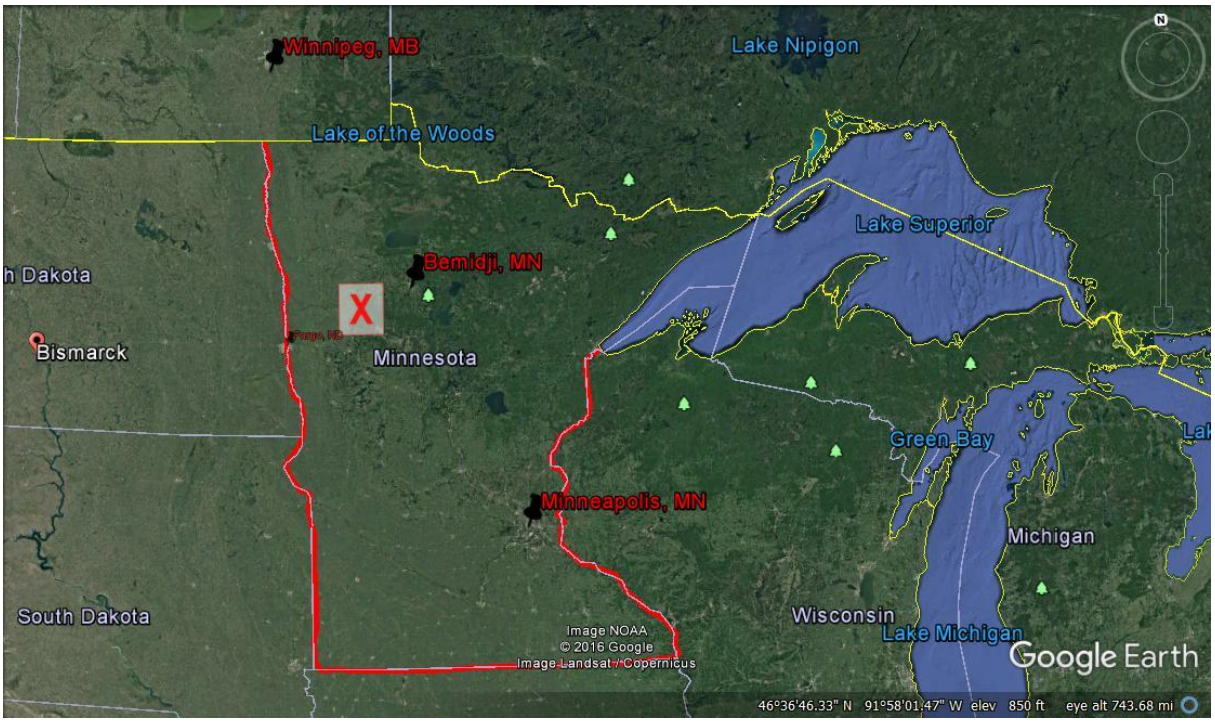

Figure 1. White Earth Nation in Minnesota, USA (Google Earth 2017b)

1.2.3 Connecting Traditional Methods of Teaching with Modern Ways of Learning

Traditionally, cultural heritage would have been taught through doing and oral history. Much of this way of doing things was lost during the reservation and residential school periods. One has only to read some of the literature from this era to understand how many Indigenous people felt: "The government had decided we were to get White Man's education by force" (Lone Wolf 1999:220). As a boy, Lone Wolf (Blackfeet) experienced 3 different boarding schools (by force) until being jailed for protecting another student from discipline. He recounts his first boarding school experience in a harrowing tale:

> Once there our belongings were taken from us, even the little medicine bags our mothers had given us to protect us from harm. Everything was placed in a heat and set afire. Next was the long hair, the pride of all the Indians. The boys, one

> by one, would break down and cry when they saw their braids thrown on the floor. All of the buckskin clothes had to go and we had to put on the clothes of the White man. If we thought that the days were bad, the nights were much worse. This was the time when the real loneliness set in, for it was then we knew that we were all alone. Many boys ran away from the school because the treatment was so bad but most of them were caught and brought back by the police. We were told never to talk Indian and if we were caught, we got a strapping with a leather belt. [Lone Wolf 1999:220]

In recent years, a resurgence in traditional ways of living and teaching has been seen in many Indigenous communities (e.g. the Bug-O-Nay-Ge-Shig language immersion school on the Leech Lake Reservation; berry and rice camps; traditional games camps, such as lacrosse; traditional craft workshops teaching beadwork, quillwork, leatherwork, regalia making, weaving, and basket making) and Elders take on the great responsibility of passing on traditional knowledge in the way their ancestors did. As the Anishinaabe language was traditionally an oral language, the cultural teachings that were part of the Anishinaabe way of life were passed on through oral history. However, for today's generations, technology has largely been embraced in the way of cell phones, video games, computers, and Internet access. This can sometimes create a communication barrier between Elders and the younger generations they are trying to teach.

By combining cultural heritage, digital surrogates, Internet access, and oral history traditions in this project, it is hoped that this communication barrier will be overcome. Research conducted by Dawson, Levy and Lyons (2011:396) presented the same hope and found their belief to ring true: in interviewing Inuit Elder Mark Kalluak, he stated "A lot of young people don't seem too interested in learning about the old ways, but I think they would with something like this…It's a new way for them to learn and that is always valuable." The project conducted by Dawson et al. (2011) presented digital cultural heritage in a virtual world format, a technology that was entirely new to Inuit Elders; however, it was well received:

> All of the Elders spoke of how these computer models, and the virtual worlds in which they were placed, would no doubt capture the attention of young people who often seem disinterested in traditional knowledge and ways of doing things. All agreed that this knowledge was essential for young people to learn, and saw great benefits in using these kinds of media armatures for transferring such knowledge to their grandchildren and great grandchildren. [Dawson, Levy and Lyons 2011:396]

The potential to connect White Earth Elders and the younger generations presents what is possibly the greatest community outcome for this project.

1.3 Thesis Structure

In Chapter 2, I discuss my inspirations for this project via similar projects that have been carried out in North America. While 3D surrogates of cultural heritage objects have been used in many instances prior to my project, this work presents it from a new angle. These projects, however different, set a foundation for ways in which 3D surrogates can be utilized for cultural sovereignty and knowledge repatriation.

In Chapter 3, I outline the two main theoretical frameworks used in this project. The first is the appropriate museology approach, as demonstrated by Kreps' (2008) work with the Museum Pusaka Nias in Sumatra. The second theoretical framework is the communities of practice approach explained by Kelly, Cook, and Gordon (2006), focusing specifically on the concerns of Indigenous communities in regards to curation and display of cultural heritage objects.

In Chapter 4, I discuss the data set used for this project. Cultural heritage objects are maintained in the White Earth Nation collections by the Tribal Historic Preservation Officer

(THPO). Cultural heritage objects are extremely important to Indigenous peoples, as they are often some of the only remains of their history; they function as reminders of a bygone way of life told through oral histories. Indigenous narratives indicate that the creation of many cultural heritage objects was not simply creating an object, but rather 'breathing life into' the object, passing from something inanimate to the world of the living (Colwell 2014). With this information, it can easily be understood that to have these items stored in boxes on shelves is unacceptable to many. The decision on which objects to use was based on discussion with the THPO, as well as after taking into consideration how each would photograph.

In Chapter 5, I outline my research methodology for this project. Utilizing photogrammetry, a Samsung NX1000 mirrorless digital camera, and a free 3D model creation application, I created 3D models that serve as surrogates for the original cultural heritage objects. I then utilized a free 3D model-upload website to create an online museum format, which enables remote access to view, interact with, and manipulate the 3D models.

In Chapter 6, I compare my project to tribal cultural heritage displays and museums. This comparison allows me to critically evaluate the outcomes of my project in meeting the needs of Indigenous people when it comes to learning about and interacting with cultural heritage objects. The first comparison is to the Bois Forte Heritage Center, a tribally owned and operated museum on the Bois Forte Nation while the second is to the White Earth RTC displays, where many of the cultural heritage objects used for this project can be viewed by the public.

In Chapter 7, I consider the limitations of this project. As a project designed to work with a small budget, its scope was constrained. Working with descendant communities also posed some limitations. Tribal entities and governments present their own limitations and can function to either help or hinder research, as I discovered during my project.

Chapter 8 lays out the future directions for this project, as well as my final thoughts. With more time, more assistance from tribal nations, and with a larger budget, this project has the potential to be carried out on much larger scales. This methodology could serve as an effective way to not only present cultural heritage objects in new and interactive ways, but could also be an important step forward in material culture preservation.

Chapter 2: Similar Projects

The use of 3D images for archaeological, anthropological, or museological applications is by no means a novel idea. Rather, since the introduction of the technology, it has been utilized in a variety of ways in these fields, mainly as a tool for further preservation (Bathow and Breuckmann 2011; Gaisecker 2005; Guidi, Beraldin, and Atzeni 2004; Remondino and Rizzi 2010; Rua and Alvito 2011; Taylor, Beraldin, and Godin 2011). Several projects working with Indigenous communities and their respective success stories were key in my decision to use a similar approach for my own research.

Peter Dawson and Richard Levy (2006; 2006; Dawson et al. 2011) have applied 3D technology in their research projects for over a decade. The vast majority of their work focuses on using these novel applications to create vital interactions between Arctic peoples and their cultural heritage (http://www.inuvialuitsodhouse.ca/, http://www.glenbow.org/thule/?lang=en&p=home). Traditional ways of displaying cultural heritage objects (e.g. trapped behind glass) function as barriers to access; this idea is shared by Dawson, Levy, and Lyons (2011), who consider that traditional display methods of cultural heritage objects effectively create a 'fourth wall' for Indigenous peoples. The idea behind their work is that by utilizing 3D technology, they can present cultural heritage in a more meaningful way, such that Indigenous peoples' interactions with cultural heritage objects is more organic than what traditional display methods allow. This observation is what truly sparked my desire to carry out this project. What is gained from these applications is that Indigenous people can feel a greater connection to cultural heritage objects in a 3D medium.

> These feelings of connectedness appear to have been enhanced by the greater sense of presence generated through the use of 3D…. We believe this has definite implications for the use of interactive 3D worlds in repatriating knowledge to aboriginal peoples. [Dawson, Levy, and Lyons 2011:389]

Dawson and Levy's work (2004, 2006) focuses on using 3D technology for traditional knowledge repatriation: by collaborating with Indigenous communities and combining oral history with archaeological findings, successful virtual reconstructions of a Thule whalebone house and an Inuvialuit Winter House were possible. Oral history was passed down about this style of house, but those alive within the communities had never seen one constructed. By using the information acquired through archaeological survey, and combining it with the oral traditions of these structures, Dawson and Levy (2004, 2006) used this 3D technology to create a virtual structure that community members could 'enter' into and interact with (http://www.inuvialuitsodhouse.ca/virtual-tour/worlds/franklin-interior.html?iframe=true&width=990&height=630, http://www.glenbow.org/thule/?lang=en&p=inside). In this way, the combined knowledge of archaeologists and community members assisted in the creation of a 3D display that was vital to digital knowledge repatriation, a relatively new concept for repatriation (Dawson, Levy, and Lyons 2011).

As Corcoran et. al (2002) note, a major move towards virtual museums began in the early 2000's thanks in part to the Canadian Heritage Information Network (CHIN). When this project saw fruition in 2001, it included the Inuit3D exhibit, which allowed visitors to experience 3D cultural heritage models that portrayed Inuit cultural heritage from the earliest known to modern times. The completed virtual exhibit allowed visitors to 'walk' through the museum, like a physical exhibit, choosing which display to view as they pleased. Along with the 3D models, the

exhibit also included historic photographs. Corcoran et. al (2002:4) indicate that "virtual exhibitions also have the potential of reaching much larger audiences and of lasting longer than traditional exhibitions." With very little overhead involved, these virtual exhibits are easily attainable for agencies with few resources both in terms of budget or staff. Creating such displays, as I have done in this project, assists in the preservation and promotion of cultural heritage while making it more accessible to stakeholders.

Isler, Wilson, and Bajcsy (2006) offer a different application for 3D cultural heritage objects in their work with The Phoebe A. Hearst Museum in California. Home to over 9,000 baskets made by California's Indigenous peoples, this collection is highly sought after by researchers, creating long wait lists to access these objects. As a solution to this problem, the authors created 3D models of the baskets and loaded them into a virtual exhibit. This removed the barriers to access that researchers faced, allowing them to conduct their work unhindered since it eliminated the need to make appointments, schedule viewings within certain hours of operation, and travel to the location where the baskets are housed. "Researchers who must travel great distances around the globe to visit collections are necessarily limited in the access they can afford by the size of their research budgets. The general public has even less access than do researchers, as the museum's gallery space is quite small in comparison to the size of its holdings" (Isler, Wilson, and Bajcsy 2006:1).

While these published works have inspired my own project, I believe that my focus on the White Earth Nation, my interest in their active participation and the use of inexpensive and straightforward methods to achieve 3D surrogates is a necessary step towards cultural sovereignty because it focuses on one band; previous projects with larger scopes were important, but their broad purview sometimes failed to meet the specific needs of individual bands or even

villages. By telling a small portion of the story of the White Earth Band, they regain pieces of their history that previously they either lost control of when culture heritage objects were removed from the band's possession or that they had no control over because a non-community member decided how objects should be displayed and what their respective meanings were. If each Indigenous group could accomplish this – regain ownership over their cultural heritage objects – it would have significant impacts on their efforts to regain cultural sovereignty and eventually political sovereignty, both key issues facing Indigenous people today.

Chapter 3: Theory

The kind of virtual museum that I have created in this project falls into the 'new museology' movement. New museology has been a developing approach to museums that considers the fact that museums have a variety of audiences and stakeholders; to meet the variety of needs, a community-based approach needs to be undertaken during curation of exhibitions. Kreps (2003, as cited in Schorch and Hakiwai 2014:195) explains that:

> The New Museology movement is largely about giving people control over their cultural heritage and its preservation as part of how they maintain, or construct their identity. The approach acknowledges the importance of preserving not only resources that represent a community's past, but also vital elements of its living culture and its continuing development.

It is not enough to step into an existing museum and begin to include descendant communities in the curatorial process. Rather, this collaboration needs to begin at the onset of museum creation, from the construction or renovation of the exhibition space to the actual displays of cultural heritage objects. Rather than attempting to rearrange the displays that White Earth already has available, it would be necessary to create a whole new space for this collaboration; this was accomplished through the creation of a virtual museum space. This ground-up approach allows for a more authentic voice to be heard from the descendant communities. Dubin (2001, cited in Shannon 2009:221) states that:

> Ideally, the new museology demands a total overhaul of museum theory and practices. The primary goal to open up space—discursive space as well as physical space—for indigenous objects to become speaking objects who voice their own ideas and continue to (or even seize control of) their own representations.

Keeping in mind that modern museums often developed within colonial fields (Barrett 2015), they often do not leave room for authentic Indigenous voice to be incorporated in curation and

display of cultural heritage objects. New museology was developed as a response to critiques of these museums (such as the George Gustav Heye Museum in New York City) and their inability to represent Indigenous narratives. According to Ruth Phillips (2003, cited in Fischer-Olson 2014:5), this shift into new museology was possible because of "1) the critical reflexivity of early traditions of the display of cultures that were informed by colonial structures, and 2) the evolution of human rights discourse".

Because this approach is not focused on appeasing the audience or the public sphere (e.g. those paying to visit the museum) but rather the constituents (i.e. community stakeholders, Indigenous people), it has the potential to seem like a failure. Shannon (2009:226) indicates that "It is in the interaction between the public and the museum where the "new museology" is most likely to break down." This is due, in part, to the fact that new museology is intended to address the concerns that descendant communities have about how their cultural heritage is curated and displayed. New museology is focused on ensuring that these communities and their authentic voices are properly included in exhibitions, which may not be appealing or of interest to the typically colonial public sphere. The new museology movement encompasses theoretical frameworks used in my project to accomplish its objective.

One of the central goals of this study is to create a virtual museum to facilitate White Earth tribal member access to culture heritage objects. As such, I draw on two theoretical frameworks. The first of these is the appropriate museology approach as used by Kreps (2008) in her work with the Museum Pusaka Nias in Sumatra. This work presents a situation that very closely resembles the same problems that Indigenous groups in North America face when looking at the preservation, curation, and exhibition of their cultural heritage. Kreps' (2008) approach encourages a bottom-up method in which the financial resources, abilities and

knowledge of museum/heritage workers, and available resources such as storage and exhibition space are all taken into consideration when a plan for curation, preservation, and exhibition is developed. As Kreps (2008:23) writes, appropriate museology is "an effort to refashion professional museum practices and technologies to better fit local cultural contexts and socioeconomic conditions." What is perhaps most important about this approach in terms of my own project is the integration of Indigenous 'museological traditions,' such as reburial of sacred and ceremonial objects, placement of tobacco with objects in collections, 'feeding' objects deemed to be imbued with spirit, and viewing objects in 3D opposed to behind glass, with professional standards of practice, including "models of museums, curatorial methods, and concepts of cultural heritage preservation" (Kreps 2008:26). Appropriate museology, for my purposes, helps to address the issues concerning limited financial resources, technology, and training that most tribal entities face in their own current and future projects for the preservation and exhibition of their cultural heritage objects.

The second approach is that of communities of practice as presented by Kelly, Cook, and Gordon (2006), with particular focus on Indigenous communities for my project. This approach explores the ways in which people learn and comes to the conclusion that learning occurs best when there is active participation (practice) (Hara 2009; Hildreth and Kimble 2002, 2004). This is directly relevant to my project as I work towards facilitating the traditional method of oral history learning from elder to younger generations through technology that the younger generations have a better connection with. The work done by Kelly et al. (2006) focused on Indigenous communities in Australia and their relationships with local museums; the outcome of their work determined that museums were often most successful when Indigenous communities played an active role in museum development and were committed to the success of the museum.

The communities of practice framework works best with Indigenous communities because of the importance placed on community involvement. Kelly et al. (2006:223) write that "being situated within the context of the community means they are actively engaged in an iterative learning process between the community and the museum." Communities of practice presents the need for museums to cater to the local community's needs, abilities, and strengths. In my own project, community involvement is the driving force behind its completion with a goal of meeting the educational needs of the community for preserving and passing on traditional knowledge and cultural heritage. Soderqvist (2010:74) suggests that this kind of community-based museology allows agencies to make better use of the resources available to them:

> Instead of employing more professional staff to amass, curate, and register artefacts in the central museum repository, scarce resources may be better used by training practitioner-curators to become gatekeepers that build relationships between the museum and the community.

Soderqvist refers to this kind of approach as a 'participatory museum' in which collection, curation, and display decisions are no longer only in the hands of 'professionals' as per traditional museum standards of practice, but are now available—and encouraged—to interested community members who wish to participate in the process. This allows for a kind of network to be created in which interactions can occur over great distances through modern technology (e.g. video-chats, instant messaging, e-mails) that connects many collections rather than a static collection of cultural heritage. This means that "…one of the implications of the participatory museum is that its collections do not necessarily have to be physically located in a central museum building" (Soderqvist 2010:74). Virtual museums containing 3D models of Indigenous cultural heritage objects can therefore be created by utilizing resources at 'satellite' collections and placing the models into a single virtual exhibition. The success of these virtual exhibitions

of Indigenous cultural heritage objects rests not in the traditional display method of an object-to-object relation—in which objects with similar function are curated together and rely on each other in the display—but rather in the creation of the object-to-subject relation "where the object remains the focal point and is accompanied by a Native person's narrative" (Shannon 2009:224).

Chapter 4: Data Set

For this project, it was necessary to choose a data set on which to base my work. With my proximity to the White Earth Nation, as well as personal relationships with tribal members, I decided to work with this particular tribal nation. Although I am a member of the Onondaga Nation, the central firekeepers of the Haudenosaunee, I have spent most of my life removed from my community and living near the Anishinaabe and Dakota communities in Minnesota and North Dakota; I have participated in powwows, ceremonies, and cultural revitalization projects with the White Earth Nation for nearly a decade now. During this time, I have become a community member and have been symbolically adopted into families where I now have 'grandparents', 'aunties', 'uncles', and 'cousins' as well as elders. Over the years, I have come to understand the frustration that many White Earth band members feel towards anthropology and archaeology, as well as how upset they are to visit museums and see their cultural heritage objects displayed inappropriately. As a specific example, I remember visiting the Crow Wing County Historical Society with a White Earth Nation elder who was incensed to discover a ceremonial rattle and drum on display. When I approached the White Earth THPO, Cayla Olson, as well as the cultural advisor, Merlin Deegan, about my thesis, it was revealed that my project perfectly aligned with the future directions of the Indigenous nation: discovering new ways to get tribal members involved in their history.

4.1 White Earth Nation Tribal Collection

The White Earth Nation Tribal Collection is housed in the RTC building in White Earth, Minnesota. Many of the objects are on display throughout the building, functioning as the only

'museum' on the reservation, while the rest of the objects are stored within the Land Office and the office of the THPO. At the time I began this project, the collection held a total of 176 objects. Objects on display can be viewed Monday through Friday from 8-4:30 pm, the operating hours of the RTC. Objects that are held within the collections can be viewed by setting up an appointment with the THPO during the aforementioned hours.

While the Indigenous nation has cultural heritage objects in their possession on tribal lands, accessing them as a tribal member (or otherwise) can still be difficult. The reservation is made up of many communities, or villages, and the community of White Earth is by no means centrally located. The most distant community of Ebro is a drive of approximately 43.5 miles, which for anyone not possessing a vehicle, presents an access problem. The Indigenous nation offers some transportation services, but these are mainly reserved for medical appointments and are not necessarily reliable depending on weather, availability of drivers, and other extenuating circumstances. For those who have transportation at their disposal, the hours during which these objects can be viewed can be problematic: for anyone working a Monday through Friday job, it would be a strain to take off time to visit the RTC during their hours of operation.

4.2 Cultural Heritage Objects

Cultural heritage objects, or cultural material remains, are the objects that are created by a particular culture or group of people and are often what archaeologists study, as they can be found in the archaeological record. The cultural heritage objects within the White Earth Nation Tribal Collections are mostly post-contact objects dating after the 1750s.

4.2.1 Importance of Cultural Heritage Objects

With the tenuous relationship between descendant communities and archaeologists (e.g. Brady 2009; Cambra 1991; Child 2009; Colwell 2014; Deloria Jr. 1988; Lonetree 2009; Magubane 2009; Martine 2003; Rand 2009; Shannon 2009; Silverman 2009; Sleeper-Smith 2009), cultural heritage objects carry much importance. For Indigenous people, these objects represent "the real people…both the people who produced the objects, and the living people for whom the objects may be an element in the creation or substantiation of their own past" (Zimmerman 2005:311). While many Indigenous peoples possess an oral history rather than a written one, these cultural heritage objects serve as the physical manifestations of their history, often allowing them to prove the truth in their version of history compared to that of the colonial power that may have written about them.

As Floyd Red Crow Westerman sings about in his 1991 song "Here Comes the Anthros," the modern relationship between descendant communities and anthropologists continues to suffer due to the historical relationship. Zimmerman (2005:301) points out that "building partnerships between archaeologists and Indigenous and other descendant communities is difficult. Problems range from administrative, as with issues of seeking permission to work in a community, to substantive, as with epistemological disputes over the generation of knowledge." Despite being an Indigenous community member myself, I am not excluded from experiencing these same difficulties when attempting to work with descendant communities. Although there is a great push for Indigenous community members to get an education and utilize their degrees to help their communities, those who go into the fields of history, anthropology, and archaeology can still find themselves feeling ostracized. Anecdotally, I often joke with my friends that my great-

grandmother would be rolling in her grave if she knew what I was doing with my life (i.e. training to be an archaeological anthropologist).

4.2.2 Cultural Heritage Objects Chosen

After setting up meetings and discussing my proposed project with the White Earth THPO, I was given access to the collections to begin choosing which objects would work best for my project. This was done with the assistance of the THPO, a White Earth band member, to gain her professional opinion on which objects had the most significance to the band. Several selection criteria were considered. First, objects needed to be complete; this meant that when an object was viewed, it had to be obvious what it was. This, unfortunately, eliminated many of the pre-contact objects from the list such as pottery shards or lithic pieces given they are fragmented. Second, objects had to be made on White Earth, or by a White Earth Tribal member, or have a distinct connection to the White Earth Nation. This criterion was harder to meet given that many of the objects in the collection had little associated provenance information, including details on how they were acquired by the Indigenous nation. If the second criterion could not be met, then the objects minimally had to be Anishinaabe in style. This again, unfortunately, removed several objects that were clearly Plains or Haudenosaunee style. The final criterion was that objects had to be readily recognizable as a 3D object. For example, there was an old treaty ledger that I considered using in my study but it would not have been easily viewed because all the pertinent information was found within the ledger's pages. As such, I excluded it from my data set.

In accordance with these criteria, my original data set consisted of 20 objects. As I began the process of photographing them for the photogrammetry portion of my project, it became

obvious that some objects were not ideal for this (a point I elaborate on in Chapter 5). Consequently, I reduced my original object total from 20 to 10. The objects used in this project, including call number, description, and photos, are illustrated in Table 1.

Table 1. Data Set[2]

Object Call Number	Object Photo
014	 Figure 2.1. Object 014 front  Figure 2.2. Object 014 back

[2] Some of the objects include photos of the backside of the object; this is due to the fact that during the photogrammetry process, the shape of the object allowed part of this back to be seen. Objects that do not include photos of the backside of the object are those in which the backside (or often, the bottom) could not be seen.

034	 Figure 3.1. Object 034 side 1  Figure 3.2. Object 034 side 2
037	 Figure 4.1. Object 037 front  Figure 4.2. Object 037 back

047	 Figure 5.1. Object 047 front  Figure 5.2. Object 047 back
R46	 Figure 6.1. Object R46 side 1  Figure 6.2. Object R46 side 2

R47	 Figure 7. Object R47
075	 Figure 8. Object 075

R57	 Figure 9. Object R57
098	  Figure 10.1. Object 098 sideview

	Figure 10.2. Object 098 sideview with lid  Figure 10.3. Object 098 topview  Figure 10.4. Object 098 topview with lid
0107	 Figure 11. Object 0107

Chapter 4.2.3 Cultural Heritage Object Narratives

Each of the 10 objects chosen in this data set has a unique story or relationship to the White Earth Band of Ojibwe. Some of these objects have little information recorded with regard to their specific origin or from where they came before they were part of the collection; however, their very acceptance into the White Earth collections assigns them certain significance. Many of the objects used in this project can be found displayed prominently at the White Earth Tribal government building.

Object 014: This object is described in the collections catalogue as "beaded pillow; very frail, looks old; origin unknown." As a beader myself, I am very familiar with beadwork styles. The back of the pillow is made of a nondescript black and white striped cotton cloth that is well worn, but not with holes. The medium upon which the beadwork was done is a low-loft black velvet; the velvet has obvious signs of wear but again, is not with holes. The beadwork is done in size 13 Charlotte or true cut beads, meaning there is one facet on the bead. This type of bead is considered 'old style' by contemporary beaders, and is most often seen in beadwork from the late 19th and early 20th centuries, especially prior to the revitalization and modernization of the powwow, which introduced very flashy beadwork using larger beads. The style of beadwork is very traditional Eastern Woodlands floral with 'bunched berries.' Although there is no information about the maker or the origination of this donation, pillows such as this were very common in Anishinaabe homes in Minnesota, either as decorations, or given as gifts or payments for services received.

Object 034: This object is described in the collections catalogue as "small beaded coin purse; very fragile" and includes a personal narrative:

> Beaded coin purse, donated by Charles J. Smith, Falcon Heights, Minnesota. This purse was traded to Smith's mother, Mrs. Doris Smith, in exchange for hospital services by a lady from Pine Point, MN. Mrs. Doris Smith owned and operated the Park Rapids Hospital during the 1930s-40s. It is during this time that Mrs. Smith acquired the purse, which was in its present condition. The Smith family assumed that this purse had been in use for many years and estimate that it could be 75-80 years old.

The purse is made of a well-worn leather with a drawstring closure. The medium upon which the beadwork is done is a low-loft black velvet, very worn with many holes and areas where the velvet has worn away. The beadwork is, again, done in the size 13 Charlotte beads; the style is not as obviously 'Eastern Woodlands' as the beaded pillow, but still follows a floral design. Lodged in the beadwork is a needle and thread, indicating that at some point, someone considered repairing the object. Given the personal narrative from Charles Smith and the composition of the bag, it is likely a late 19th century made object. It is interesting to note that it was not created specifically for payment; rather, it was used personally before being exchanged through a system of reciprocity. This would indicate that the hospital services carried out by Mrs. Smith warranted an immediate payment, perhaps for something severe.

Object 037: This object is described in the collections catalogue as "small beaded pouch with strawberry design; near perfect condition; origin unknown." The pouch is a 'clutch' style bag with a snap closure. The medium upon which the beadwork is done is unknown; the bag has a calico cotton lining and is trimmed with a cotton bias tape. The beads that make up the floral and strawberry designs appear to be size 9 tri-cuts (beads with 3 cut facets on them) while the background transparent crystal beads appear to be size 12 tri-cuts (a common technique is to use the smaller bead for the background as they can fill the open space more efficiently). Tri-cut beads did not become popular until the powwow revitalization of the mid-20th century. Around the trim, there are single bugle beads, some with thread pulling out. The design and materials

used in this pouch lead me to believe that it is likely from the mid to late-20th century. It does not have any obvious wear, except that the beads are slightly discolored from age.

Object 047: This object is described in the collections catalogue as "stone statue with carving and etching; by Gordon Van Wert." The medium for this statue appears to be soapstone with a marble grey color while the base upon which it is places is an unknown wood. The statue depicts a female figure in traditional dress, with a feather on her head and multiple feathers etched into her shawl. Gordon Van Wert is a well-known artist who is an enrolled member of the Red Lake Band of Chippewa, a reservation north-northeast of White Earth.

Object R26: This object is described in the collections catalogue as "leather pouch with 2-sided beading (berry design); fair condition; origin unknown." The medium upon which the beadwork is done is a brain-tanned leather (most likely deer); the pouch has fringe at the bottom and a drawstring closure. The beadwork is done in size 13 Charlotte cut beads with a floral motif and the 'bunched berries' design; the top edge of the bag (around the closure) is trimmed in the same beads. Several of the bead colors are easily recognizable as greasy yellow and Cheyenne pink, which were readily available and popular at the turn of the 20th century. With little wear visible on the pouch and the colors used, I estimate this bag to be made in the early 20th century.

Object R47: This object is described in the collections catalogue as "adult traditional moccasins; fair condition, look somewhat aged; origin unknown." These moccasins are a T-seam style with a puckered top; the Ojibwe are known for this style, often referred to as the "Puckered Moccasin People" (Schaetzl n.d.). The leather is brain-tanned (most likely deer). The medium upon which the beadwork is done is a low-loft black velvet, which is slightly worn but without holes. The beaded panels are trimmed with a cotton bias tape, which also creates a tie

for the ankle. The beadwork is done in size 13 Charlotte cut beads in a floral design, and the item is complete with vamps (tops) and cuffs. The vamps have a unique thread-embroidered trim around the sides and bottom. With the leather showing little wear, it is unlikely that these were often (if ever) worn. Based on the style and the materials used, I estimate these to be early 20th century.

Object 075: This object is described in the collections catalogue as "cradleboard with beaded blanket and headboard charm; by Merle Stone; perfect condition." The cradleboard is made from a very lightweight, unknown wood (perhaps cedar or ash, which would be readily available in the area) with a medium-dark stain. It is lined with a soft, faux-fur lining upon which an infant could be comfortably placed. Rather than being a 'moss-bag' style (where the baby is swaddled and laced into the bag), this cradleboard has a beaded blanket with ties over it (likely not functional, but decorative). The medium upon which the beadwork is done is a low-loft black velvet, in excellent condition. The beadwork is a floral motif done in size 13 Charlotte cut beads, trimmed with a cotton bias tape; this same bias tape is also what the ties are made from. Hanging from the headpiece is a small dreamcatcher. Merle Stone is an enrolled White Earth band member who also makes stone carvings, ash baskets, porcupine roaches, and other beadwork.

Object R57: This object is described in the collections catalogue as "leather mittens with fringe and floral beading; fair condition, look aged; donated by Jean Bakka, artist unknown." This piece is part of a collection known as the Bakka Collection, items donated by White Earth band member Jean Bakka; these items had been in her family for many years. The mittens are a gauntlet style glove made from brain-tanned leather (most likely deer); the mittens have leather fringe on the exterior sides and are lined with a calico cotton lining. The mittens show

considerable wear, as evidenced by scuffing, discoloration of the leather, and fraying at the seam around the opening of the mittens. The beadwork is done directly on the leather in size 13 Charlotte cut beads, with some of the beadwork having come out. Included in the beadwork is a floral motif done in Cheyenne pink. Based on the condition of the leather and the beads used, I estimate these to be early 20th century.

Object 098: This object is described in the collections catalogue as "small lidded basket with four colors quillwork inlay; great condition; donated by Jean Bakka, artist unknown." The basket is made of birch bark with a quillwork design covering it and trimmed with sweetgrass. This is another item from the Bakka Collection. The lid of the basket has a quilled medicine wheel in the four colors (white, yellow, red, and black). The basket is in excellent condition and has likely never been used, only displayed. Based on the design and condition, I estimate the basket to be from the late 20th to early 21st century.

Object 0107: This object is described in the collections catalogue as "beaded knife sheath with fringe; fair condition, looks aged; donated by the Kaiser Family, artist unknown." The knife sheath is made of a nondescript cotton fabric, black on the backside and white on the front. The medium upon which the beadwork is done is the white cotton fabric on the front, which is relatively discolored where it is visible. The beadwork is done in size 13 Charlotte cut beads and is a berry motif; the beads are in excellent condition, with no visible discoloration of the white background beads. The knife sheath has beaded fringe on one side, done in larger hex cut style beads with bits of yarn hanging from them; this fringe is in disrepair, with about half of it missing altogether. The knife sheath has no obvious attachment point, but may have been sewn onto regalia at one point, as it appears more ornamental than practical. Based on the materials used and the condition of the knife sheath, I estimate this to be an early 20th century item.

Chapter 5: Methodology

The creation of 3D images is a growing industry, with applications ranging from high tech software and devices to more low-tech options via cell phone and tablet applications (e.g. Beraldin et al. 2005; Godin et a. 2002; Guarnieri, Marten, and Vettore 1999; Hess and Robson 2012; Koistinen, Latikka, and Pontinen 2001; Pollefeys et al. 1999, 2001; Remondino and El-Hakim 2006; Se and Jasiobedzki 2006; Sgrenzaroli 2005; Taylor 2001; Tsiouskas, Patias, and Jacobs 2004; Wachowiak and Karas 2009; Wulff 2010). Through my supervisor's lab in the Department of Anthropology, I was offered the use a Next Engine 3D table top laser scanner to produce 3D images of cultural heritage objects in my data set. I opted not to use this scanner because it was not likely to be replicable by other Indigenous nations for their own preservation projects given the expense to acquire similar scanning systems, as well as it being difficult both to transport and set up, which were entirely impractical for my project. I instead chose to utilize an available application that relied on photogrammetry to create my 3D images from the objects in my data set.

5.1 Photogrammetry

The term photogrammetry may be one that many are unfamiliar with, but the technique has been used for several years to do many things including the recreation of traffic accidents (e.g. Chen et al. 2015), to remotely record data about large mammals for conservation efforts (e.g. Berger 2012), and for forensic pathology applications (e.g. Urbanova, et al. 2015), among others. "Photogrammetry is the science of making measurements from photographs. The output of photogrammetry is typically a map, drawing, measurement, or a 3D model of some real-world

object or scene" (Walford 2009). The style of photogrammetry utilized for this project is considered 'close-range,' meaning that it was done using a hand-held camera.

With the software chosen for this project – Autodesk© 123D® Catch – a range of 30 photographs minimum, to 70 photographs maximum, were needed for each item. The software also suggested using a camera with less than 10 megapixels since the higher the megapixel, the more detail an object will show, and the more difficult it will be for the software to smoothly stitch the photos together. I used a Samsung NX1000 camera with the megapixel setting at 5 and no flash. Objects were placed on clean, blank surfaces with number cards around them as waypoints for the software, which was especially key when photographing objects that had little change in their exterior appearance (Object 098 is an excellent example). Figure 12 shows what this set up looked like.

Once the set up was complete, a series of overlapping photos from all angles were taken. The final step in the process was to upload the series of photos into the software to create the 3D image. Each object could take up to several hours to complete this process from set up to 3D object creation. While this mode of photogrammetry and 3D image creation was successful, its major downfall was that it could not create the surface upon which the object was sitting, which often meant that the bottoms or undersides of objects could not be included in the generated 3D image.

Figure 12. Object 047 during the photogrammetry process

5.2 Software

The software I chose for this project is known as 123D® Catch by Autodesk©; the version I utilized is open-source, but there are other versions available for purchase. It can be downloaded (http://www.123dapp.com/catch) and used from many platforms. For the purposes of being able to edit the images prior to upload, I utilized the PC download. The software has been available for several years and was recently revamped within the past year making it easier for non-experts to use and to create 'cleaner' 3D images that are more compatible with virtual reality (VR) headsets.

When the 3D images are created, there is 'background noise' resulting from the surface on which objects were photographed, and the numbered waypoints used to assist the software in 'stitching' photos together. Figure 13 shows an object that was removed from the data set because of too many similarities on the surface, which prevented an effective 'stitching' of photos. Figure 13 accurately depicts what the 3D images look like prior to being edited.

Editing involved shifting planes around the 3D images to remove parts that were not vital, including: numbered waypoints, the surface upon which the object was sitting, and walls that may have been included. While this would have been possible on a handheld device using the software application, I chose to utilize the computer software for this as it allowed me greater precision in editing the objects. Figure 14 shows what the editing process looked like.

While many the objects could be cleaned up with excellent results, there were a few exceptions in which outlying pieces of the object (e.g. fringe, beaded dangles) prevented a 100% accurate clean up. In these cases, objects typically display a 'chunkiness' around these features yet continued editing of the objects would have resulted in the removal of the features. Therefore, I decided to include the 'chunkiness' to preserve the integrity of the object as a 3D image. Figure 15 illustrates an excellent example of this wherein the leather fringe on the gauntlet style mittens would have been removed from the image had further editing taken place.

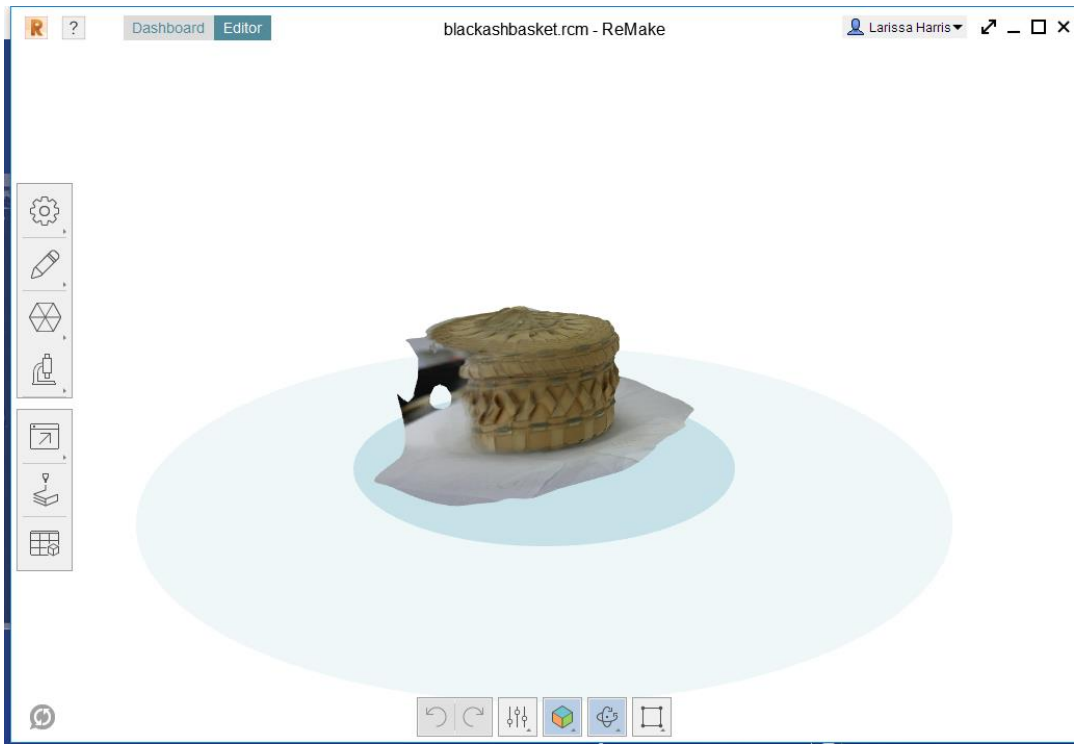

Figure 13. Black ash basket removed from data set

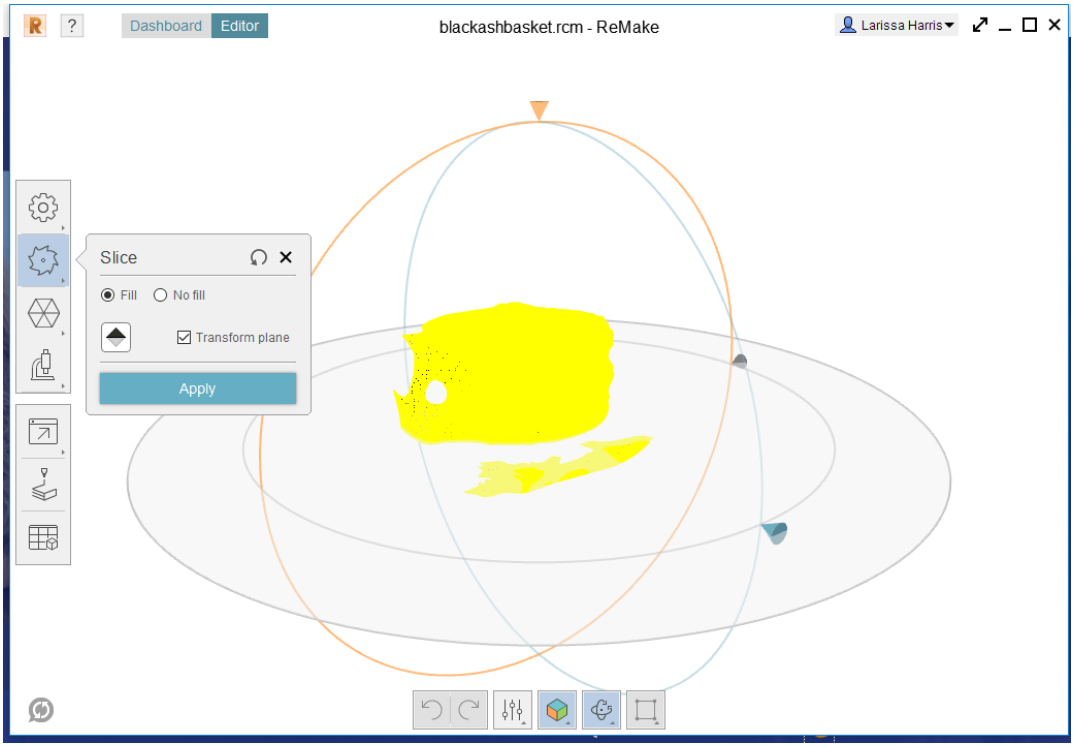

Figure 14. Black ash basket in edit mode

While the software worked for 10 objects in my data set, my original data set was 20 objects. As the photogrammetry process began, it became clear which objects would and would not work. One of the first problems I encountered was that objects with a shiny or reflective surface could not accurately be photographed: without a textured surface, the software could not effectively stitch the photos together, even with numbered waypoints as guides. This eliminated an example of contemporary ceramics with glazed surfaces. The second problem I encountered was that objects with extremely homogeneous and continuous surfaces could not be accurately photographed, even with the numbered waypoints. The black ash basket from Figure 13 illustrates this well: the exterior and top of the basket do not change, causing the 3D image to 'collapse' on itself at different points around the image. Interestingly, a similar object that I did have success with was Object 098, the quilled box. Despite the continuous and homogenous exterior of the box, the fact it was decorated with colored quills on the lid provided enough contrast for the software to accurately create the 3D image with minimal distortion, as depicted in Figure 16.

Another flaw I discovered in the software was that despite objects being '3D,' if they were not large enough, the photogrammetry was not effective. My original data set had included some examples of contemporary beadwork that dated back to traditional beadwork styles in the way of a bandolier bag and a set of quilled and beaded barrettes. Because there was not enough 'depth' to these objects, the photogrammetry produced very flat images that looked more like basic photographs than 3D objects. As I took photos and uploaded them, I became more aware of the limitations of the program and began eliminating objects from my data set until I came upon the 10 that were successfully used.

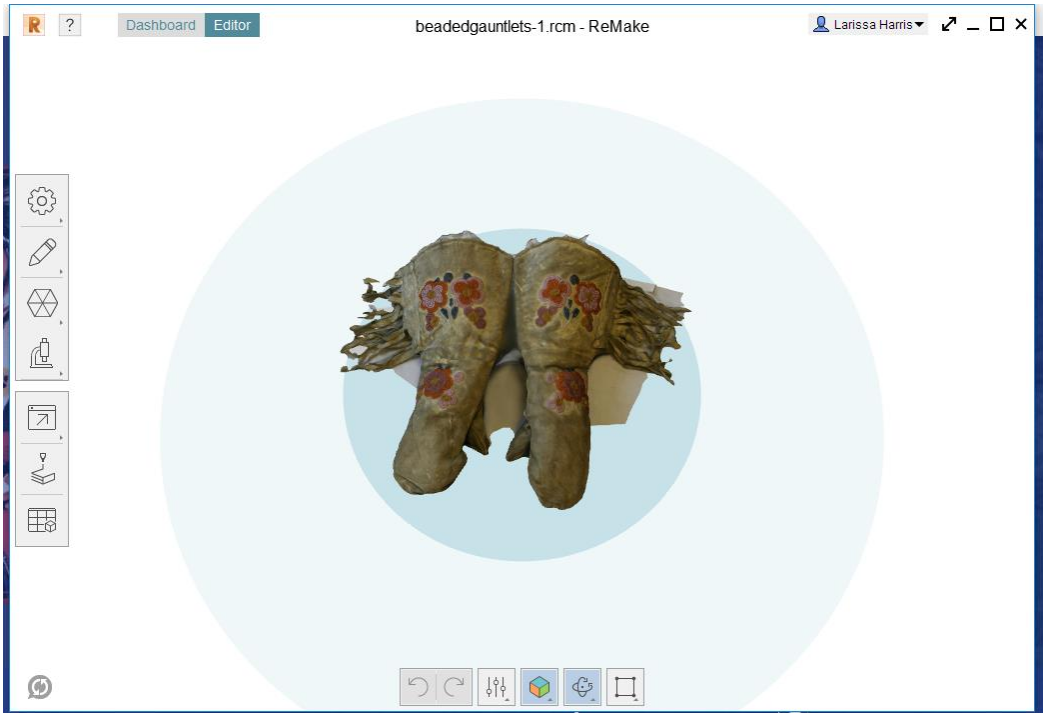

Figure 15. Beaded gauntlet style mittens after editing

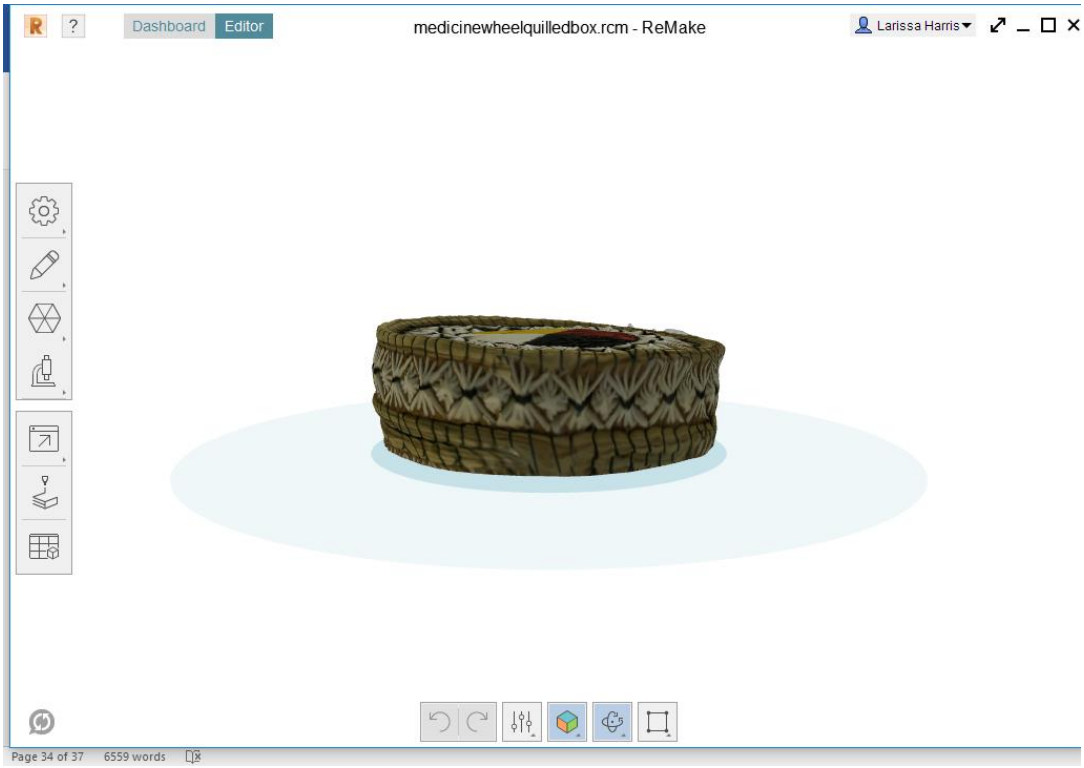

Figure 16. Distortion of Object 098

The process of utilizing photogrammetry and uploading the photos into the software was one that required some practice. There were several occasions where, despite feeling I had included enough photos, I had to retake a photo set to include even more photos of an object in order to generate a more accurate 3D image. A general rule of thumb that I quickly adopted was that more was better. In other words, even though I may have covered all the surfaces of an object with numerous photographs, I would take extra overlapping images to ensure that the program had enough information to appropriately stitch them together.

5.3 Online Museum

Perhaps the most difficult task for me in this project was finding an online museum-style database into which I could upload the 3D images to create my online museum. While there are many options available with elaborate and costly features (such as Artsteps, http://www.artsteps.com/, Navigator 4D, http://www.navigator4d.com/index.html, and CONTENTdm®, http://www.oclc.org/en/contentdm.html). I chose an open-source option to maintain one of my key project goals, which is to ensure ease of replicability and maintain low cost so that others could create a similar online culture heritage resource. The website I chose is Sketchfab©. It is simple to use, free for the basic version (which had all the features I needed for my project), and has the VR options built into the website. Not only was I able to upload my 3D images but I could also place them into a collection, making them easily accessible as a single unit for White Earth visitors, among others. Figure 17 shows the homepage for the White Earth Nation Tribal Collection that I created using the 3D images from my data set (https://sketchfab.com/harrislar/collections/white-earth-nation-tribal-collection). It has a brief

description of the data set and the purpose for the creation of the images, which is useful for visitors to read prior to viewing the images.

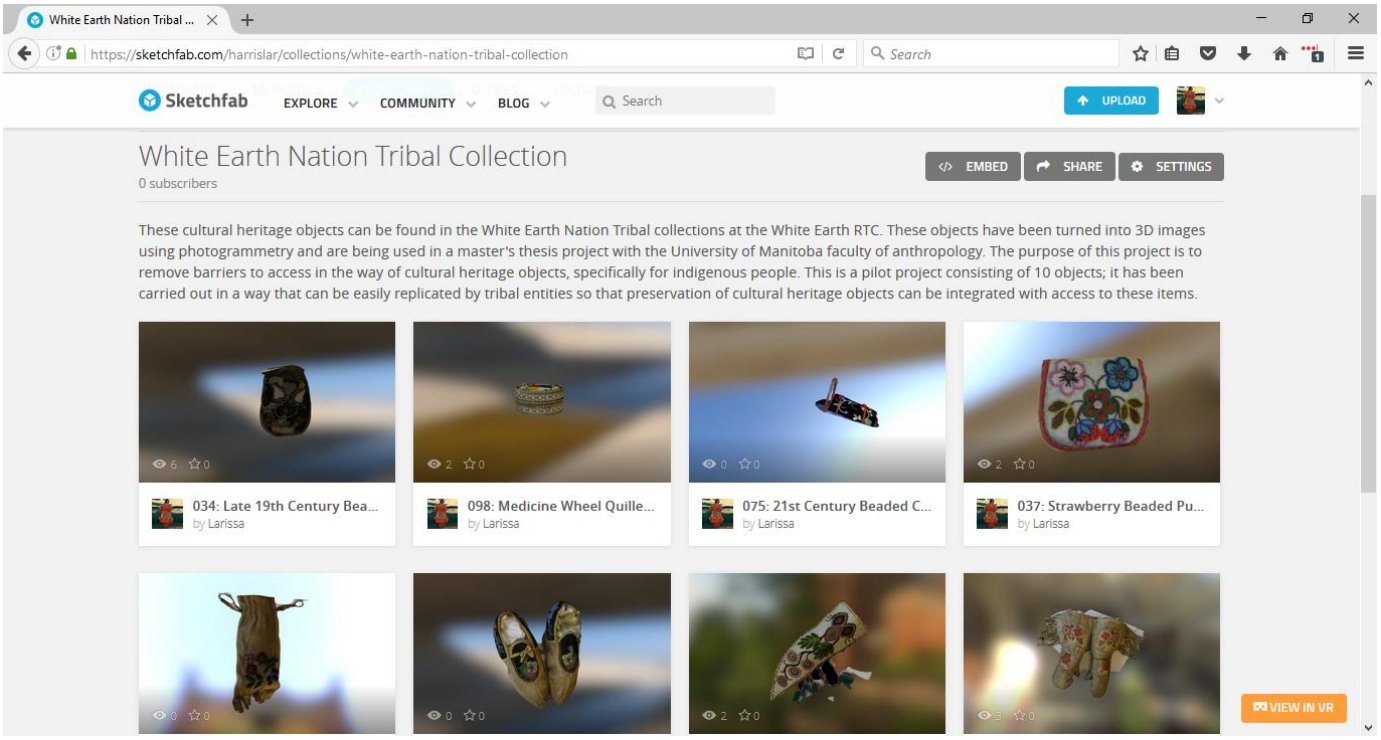

Figure 17. Homepage for the online museum on Sketchfab

To upload a 3D image, one must begin with the 123D® Catch program. After an image has been satisfactorily edited, it must be exported, using the toolbar on the left side of the screen. Figure 18 shows what the export process looks like. Sketchfab© indicates on its upload page what types of files work best for their format. I chose the .fbx that is optimized for AutoCAD.

Once the object has been exported from the program, it can then be uploaded into Sketchfab©. In the upper right corner of the website, there is an upload button that will allow

users to upload 3D images onto the website. The export file is chosen and as the file uploads, the user can title the image, write a description, place it into a category, and assign 'tags' that make it easier to discover online. Figure 19 illustrates what this process looks like:

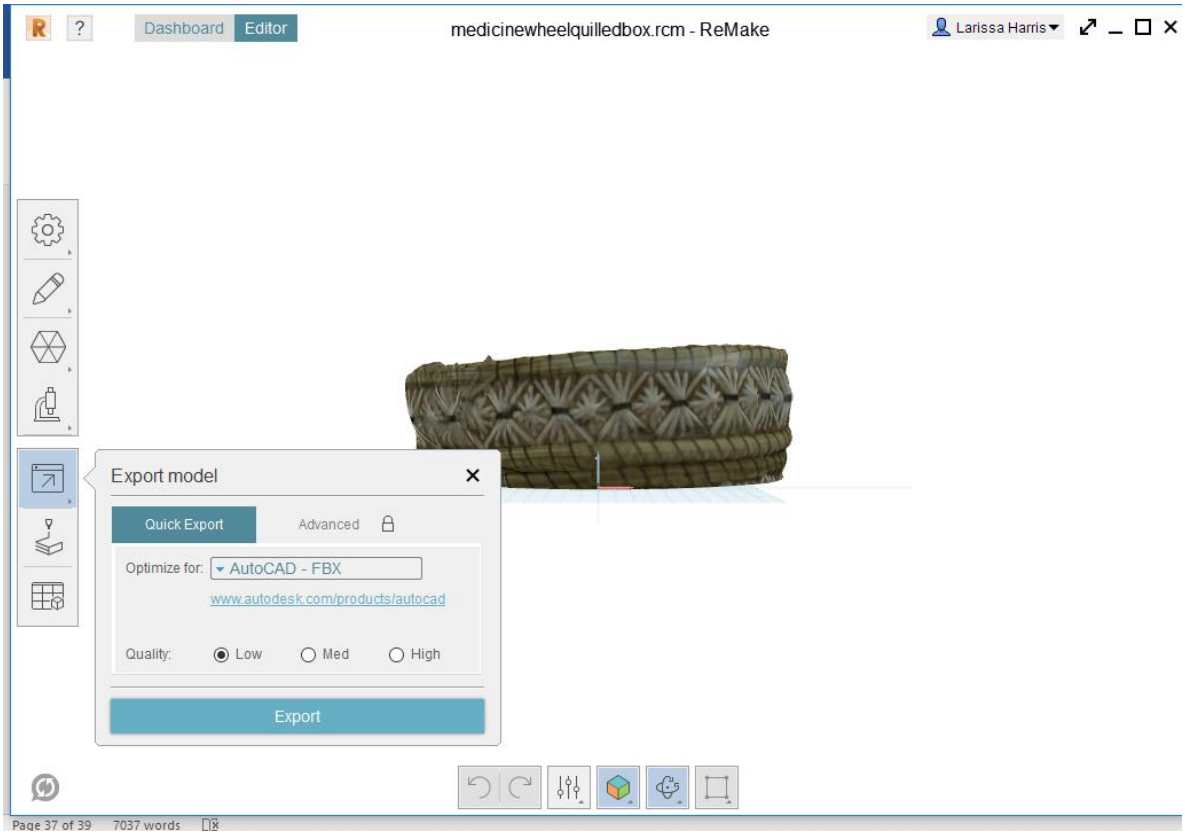

Figure 18. Exporting Object 089 for upload

Once the forum has been filled out in a way that makes discovering and learning about the object easy, one can manipulate and further edit the object within the online setting. This allows users to 'place' the object in the way that visitors will view it including being able to zoom in or out on the object, change the settings to lighten or darken the image, and more, as depicted in Figure 20.

When descriptions, tags, and edits are completed, the object can be published and will be visible to anyone with an Internet connection. Individual objects can then be placed into a collection (as was done with this data set). When an object is viewed by a visitor, it will open with the object centered on the page, the description of the object visible below, and a forum for visitor comments, as shown in Figure 21.

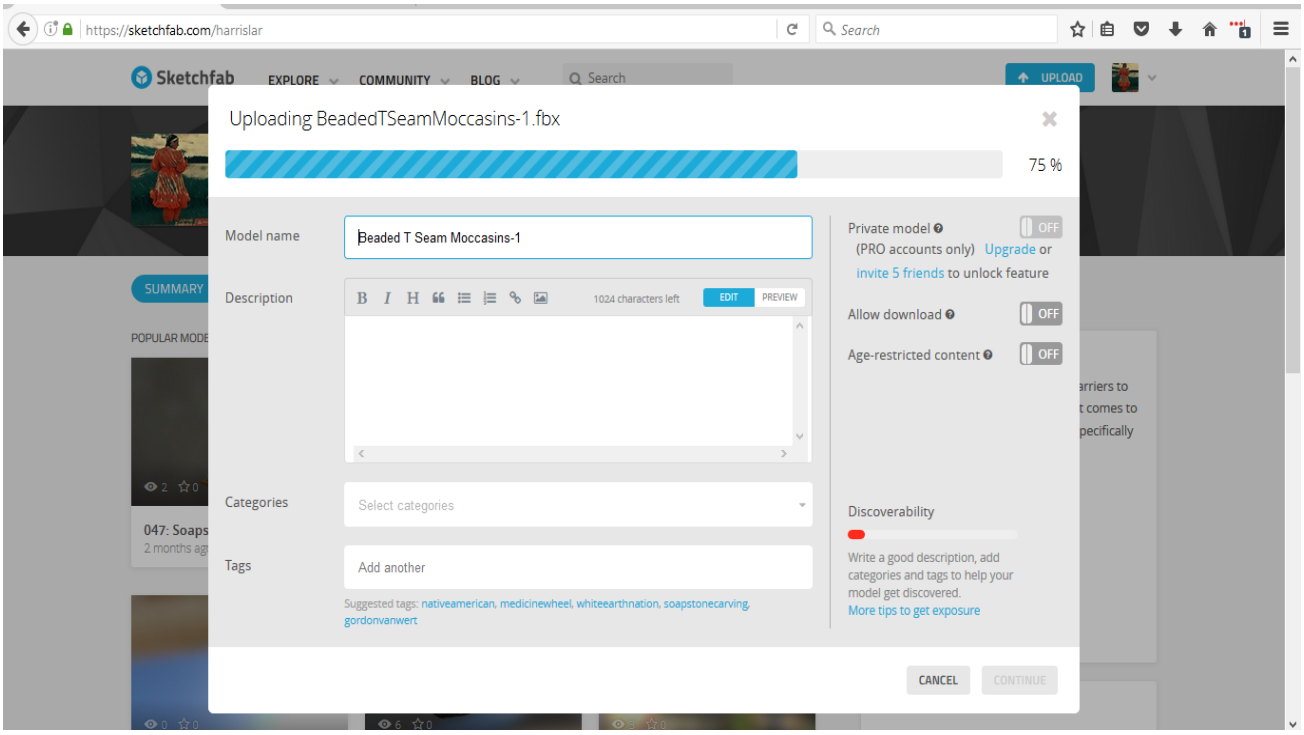

Figure 19. Uploading Object 047 into Sketchfab

The author of the model can track the number of visitors to each object, which can be used to determine its effectiveness. Visitors have several options for viewing the images: from a computer, images can be viewed in standard form (Figure 21), theater form, or a beta VR option

with certain Internet browsers. From a handheld device, objects can be viewed in the standard form, theater form, or VR with various VR headsets. These options mean that people with a good working knowledge of computer technology can interact with the images in a variety of ways, all of which preserve the integrity of the object and mimic hands-on physical interactions, allowing one to turn, reposition, or even zoom in for detail.

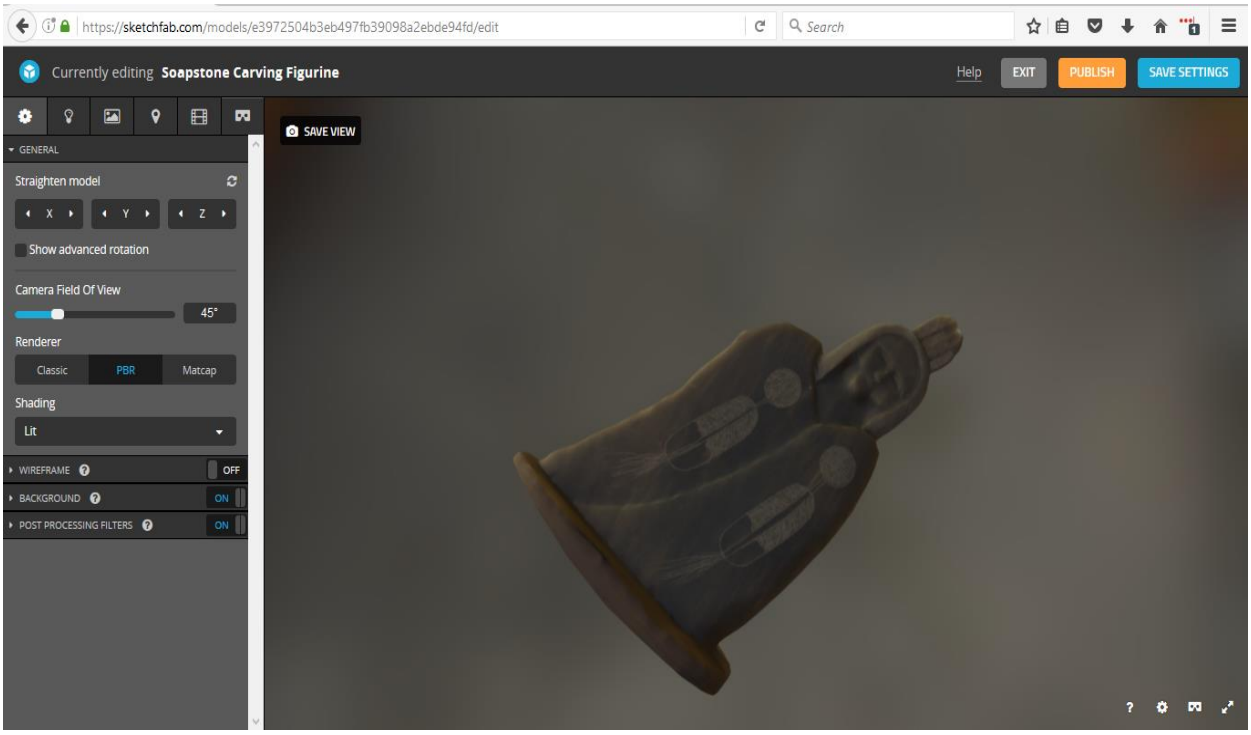

Figure 20. Editing Object 047 in Sketchfab

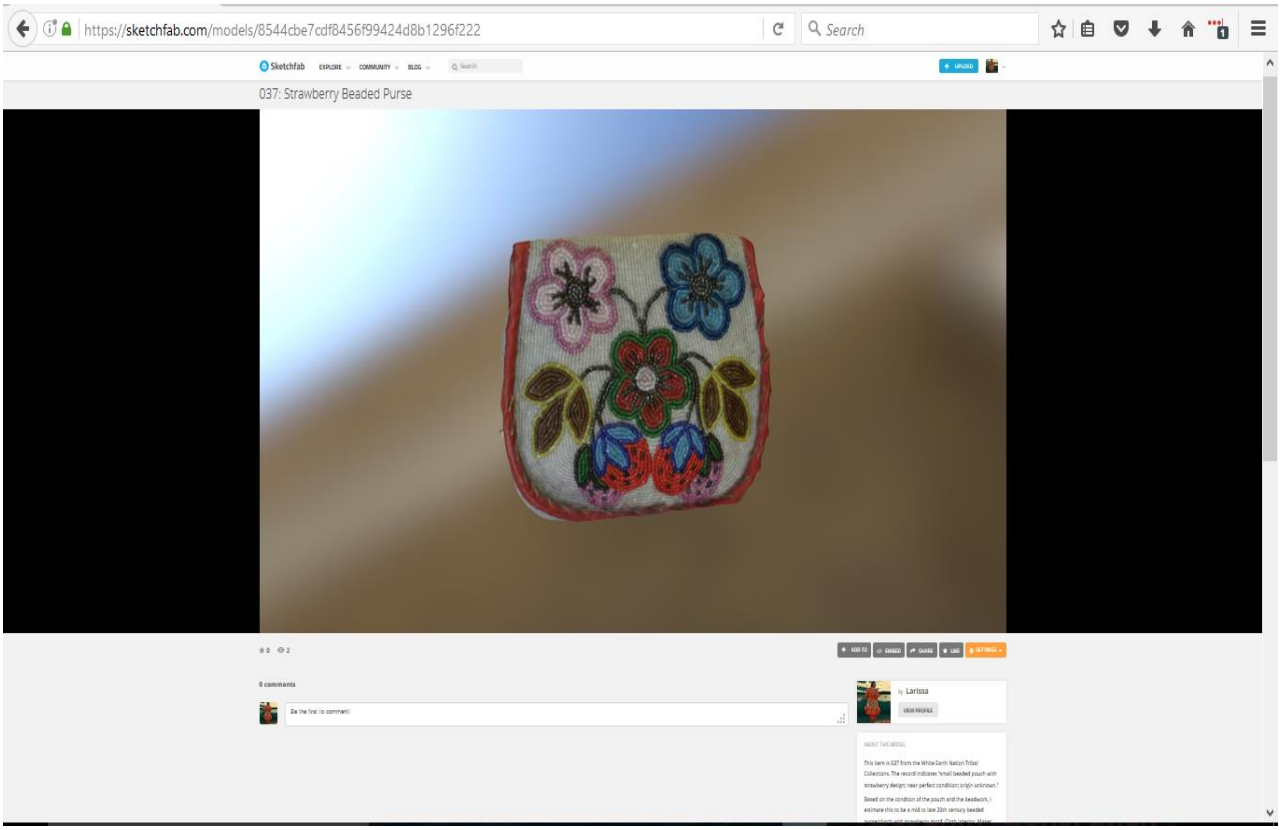

Figure 21. Object 037 in Sketchfab

Chapter 6: Museum Comparisons

To determine the effectiveness of this project, I compared the completed digital museum to other physical displays that included similar cultural heritage objects. Displays such as local county historical societies, state historical societies, and federal institutions tend to present a skewed data set that would not likely reflect the concerns or desires of Indigenous people. One such museum is the National Museum of the American Indian (NMAI) in Washington, DC. Despite its name, the museum struggles to find balance between meeting the needs of its audience (primarily non-Indigenous people) and its constituents (Indigenous people). Brady (2009:134) explains that:

> Although for many American Indian people the NMAI represents an unprecedented expression of cultural sovereignty, the museum has a number of problematic aspects that have yet to be questioned, including its role in reproducing national identity, the fund-driven majority museum, and the collection of Native culture for a largely non-Native audience.

Whereas a tribal museum is designed to meet the needs of its constituents (tribal members) first, public museums such as NMAI are fund-driven, which means they must meet the needs of their audience first. Although Shannon (2009:219) writes that "One of the goals of the NMAI is to fill in the gaps left by popular, inaccurate stereotypes of Native Americans through "authentic" representations of Native peoples," the question of who makes decisions on this "authenticity" remains. While the museum may be successful in presenting Indigenous cultural heritage through objects, narratives, and interpretation, it fails to meet a specific need that Indigenous people have: for museums to present the truth, which is not always pretty to look at or easy to accept. This idea of truth, in some Indigenous communities, is equal parts historical accuracy (colonial policies, forced removal, military attacks and massacres) and traditional knowledge

(creation stories, oral history, landscape utilization); however, as each Indigenous nation and their respective communities have different concerns and perspectives, the construction of truth for each will vary. In this way, "…the museum fails to serve as a site of truth telling and remembering and…it remains very much an institution of the nation-state" (Lonetree 2009:323). Tribal museums serve as sites of decolonization, where band members can come face to face with the atrocities carried out on their people through exhibitions, narratives, artwork, and objects. NMAI fails to do this in its representation of Indigenous history, likely because this would not appeal to its audience. Lonetree (2009:323) again writes:

> The silence around the history of colonialism throughout the Americas at the NMAI fails to challenge the public's steadfast refusal to face this nation's genocidal policies that had, and continue to have, a devastating impact on Indigenous people. Nor does this silence assist native communities in recognizing how colonialism has affected all areas of their lives, including how to embark on the necessary changes to move toward decolonization and community healing.

Tribal museums are a necessary response to this problem. Around the world, Indigenous museums that are created by and for Indigenous communities have taken on the burden of being truth-tellers for their respective communities (the Ziibiwing Center for Saginaw Chippewa and Great Lakes Anishinaabek, http://www.sagchip.org/ziibiwing/, and the Museum of New Zealand Te Papa Tongarewa, https://www.tepapa.govt.nz/, are examples). There are several displays in Minnesota that accomplish this as well. To present a comparison of displays as close to this data set as possible, I have included comparisons of the Bois Forte Heritage Center, a tribally owned, created, and run facility, as well as the White Earth RTC displays.

6.1 Bois Forte Heritage Center

The Bois Forte Heritage Center is located in Tower, Minnesota on the Lake Vermillion Reservation near the casino (Figure 22). The heritage center can be visited from 9-5, Monday through Saturday (similar to the White Earth RTC hours); there is an admission fee of $5.00 for adults, $3.00 for children 4-12 and seniors, and free to band members. Already, we have several barriers in place for visiting: travel, hours of operation, and entry fees.

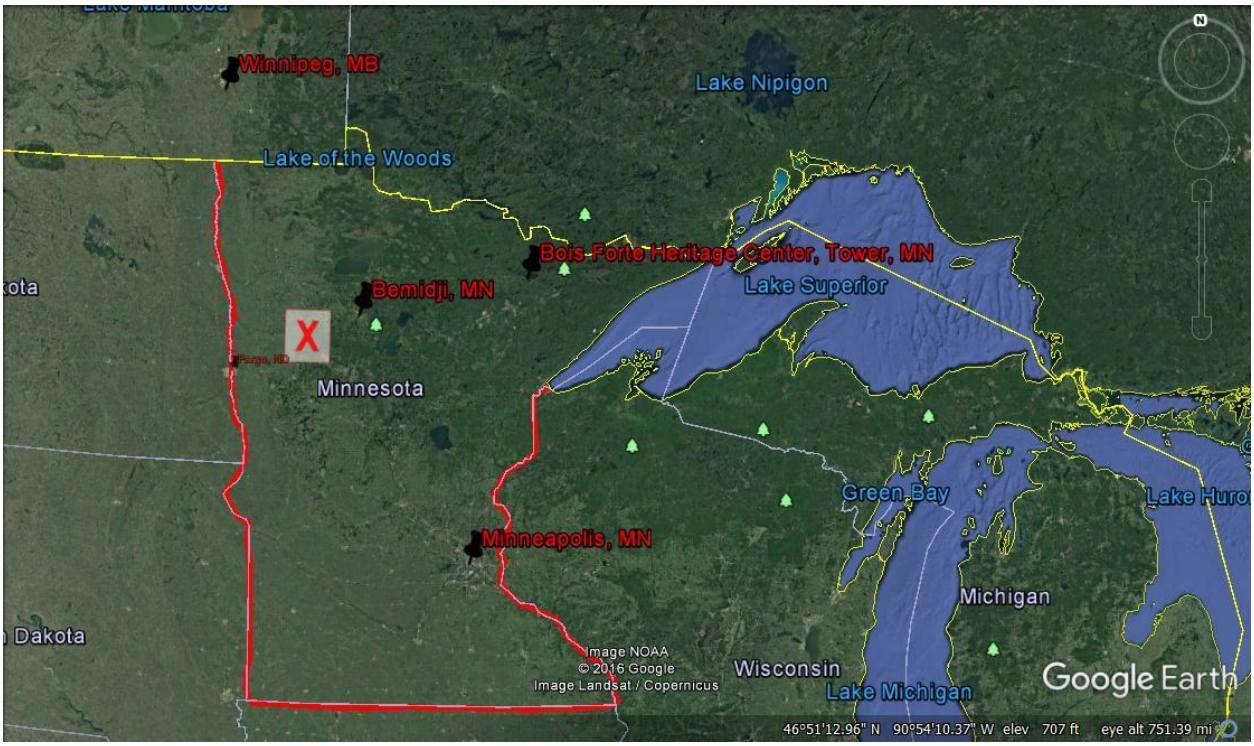

Figure 22. Boise Forte Heritage Center Location (Google Earth 2017a).

When one visits the heritage center, it is nestled in a serene wooded area with hiking trails near the building. The building is referred to as the Legend House because it is dedicated to telling

the story of the Bois Forte Band of Ojibwe; the surrounding grounds also feature traditional styles of lodges such as birchbark and tipi structures. Upon entering the building, visitors are immediately greeted with a gift shop and a fee collection stand; for some Indigenous people, this 'gatekeeper' can sometimes be seen as inappropriate and may dissuade them from continuing with their visit.

The format of the museum is cyclical, which would be a traditional way of story-telling. Visitors are initially greeted in the displays with a mural and recordings telling the story of the migration of the Ojibwe people from the East to their current locations; this mural and the recordings are done by Frank Gahbow, a well-known local historian and former THPO for Bois Forte.

Figure 23. Ojibwe origins mural and display; Bois Forte Heritage Center

As visitors continue through the displays, they are transported through the history of the band in its current location: pre-contact dwellings, fur trade and contact era, reservation and boarding school era, and contemporary culture and language revitalization movements. Figure 24, a cradleboard display, illustrates one of the problems with displays in this location: they are located behind glass. While this serves to help in the preservation of objects, it does prohibit the kind of interactions that would be appropriate for Indigenous people, to feel and move those objects and connect with the spirit the object has and the person who made that object.

Figure 24. Cradleboard display; Bois Forte Heritage Center

One has only to look at the display to see that it is 'off limits,' trapped behind a piece of glass that prohibits seeing its different sides and surfaces while at the same time experiencing a glare from the lighting in the display areas, reflecting nearby displays. This kind of display technique is yet another barrier that Indigenous people are often faced with when it comes to learning about their own history.

Another area in a hallway had beadwork examples on display, without much in the way of provenance. Yet, this display of simply placing these objects on a piece of velvet over a table, was a notable improvement over the display cases and objects behind glass. Figure 25 depicts a pair of moccasins from this table of objects: one can see just from the photograph how much more detail is apparent when objects are no longer behind glass. In comparison, Figure 26 depicts another display from the Heritage Center in which moccasins are within a glass case: despite the case being two-sided, the glare of the glass continues to function as a barrier. With the moccasins on the table, one could at least lean over to view the many sides of the object, even though it could not be physically picked up and turned (per the card placed on one end of the table that instructs visitors not to handle the objects); this was accomplished simply by removing them from a glass case.

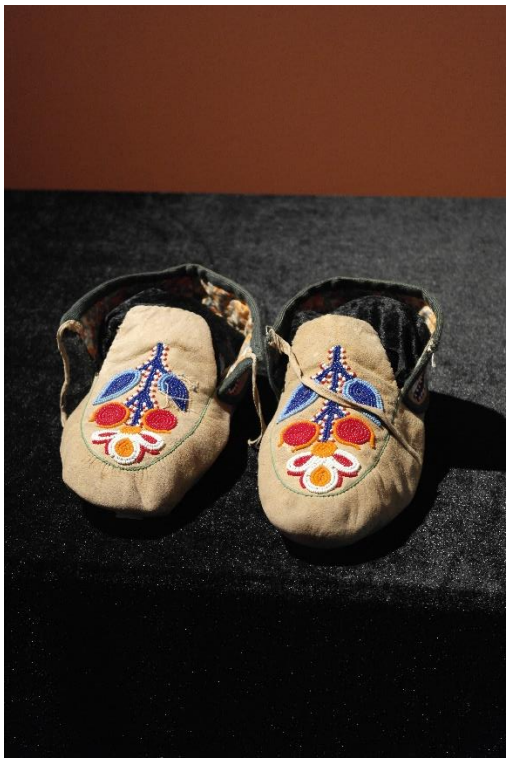

Figure 25. Beaded moccasins on table display; Bois Forte Heritage Center

Figure 26. Regalia set (with moccasins) in glass display; Bois Forte Heritage Center

Within the displays, an important inclusion (that was, unfortunately, not found on many of the cultural heritage objects) was a language component. While many of the object display cards showed the English word for the object, in a few cases, there was language inclusion, such as can be seen in Figure 27 – a photograph of a poster hung near the cradleboard displays:

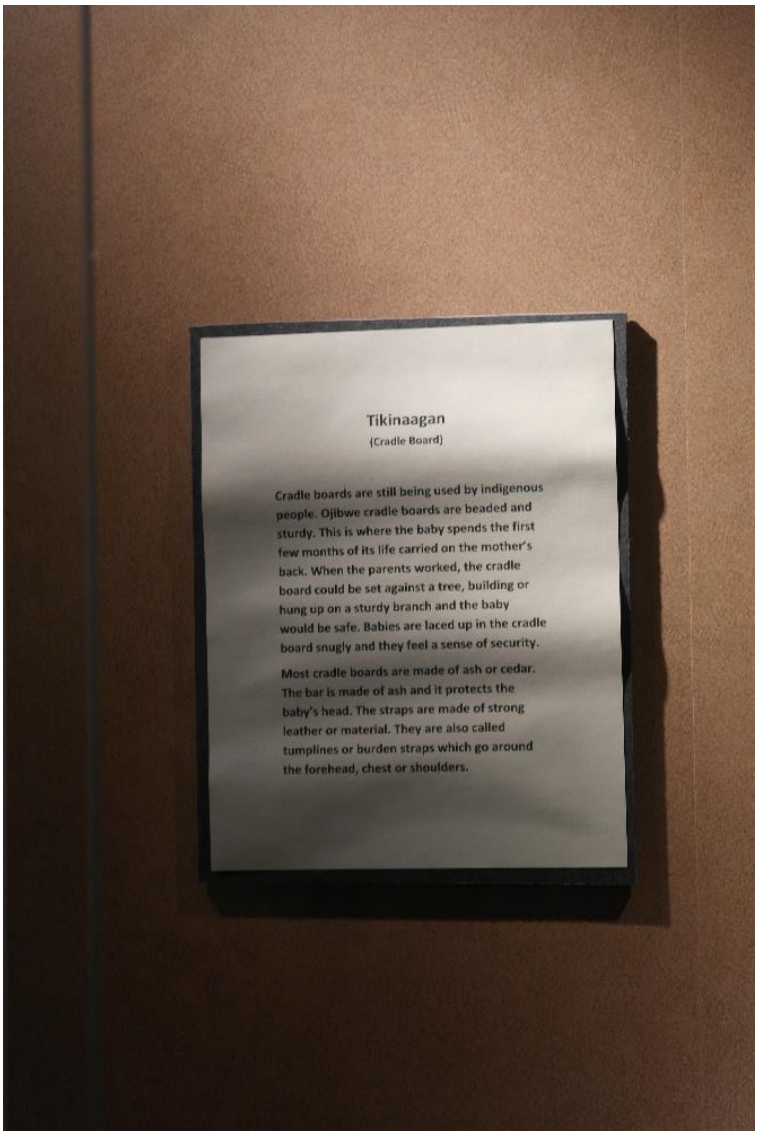

Figure 27. 'Tikinaagan' poster near the cradleboard displays; Bois Forte Heritage Center

6.2 White Earth RTC Displays

While Bois Forte maintains a physical museum, White Earth does not. What it does have, however, is a tribal government building where cultural heritage objects are on display to

visitors. The RTC building is in White Earth, Minnesota, which serves as the main government offices for the band (the community also houses medical services, schools, housing, etc.). The building is open Monday through Friday 8 am - 4:30 pm. There is no admission fee to enter the building, but visitors are required to sign in at the front desk. Here, we have fewer barriers than at Bois Forte but still the barriers of travel and hours of operation remain.

The displays within the RTC building are found throughout, rather than being centrally located on one floor or in one area. Immediately upon entering the lobby, visitors are flanked on both sides by display cases. These displays have low lighting and typically contain the most intact and aesthetically pleasing objects (the displays are often changed out or moved around to allow for objects in storage to be viewed). Historic photographs are also included (see Figure 28).

Cultural heritage objects from either the Kaiser or Bakka collections are usually displayed together with information regarding their provenance and historical value. While this method of display provided much information to visitors about the history of these objects, the display cards left much to be desired in the way of design, and the glass, again, created a barrier and glare on the objects housed within.

Figure 28. Displays immediately within the White Earth RTC building

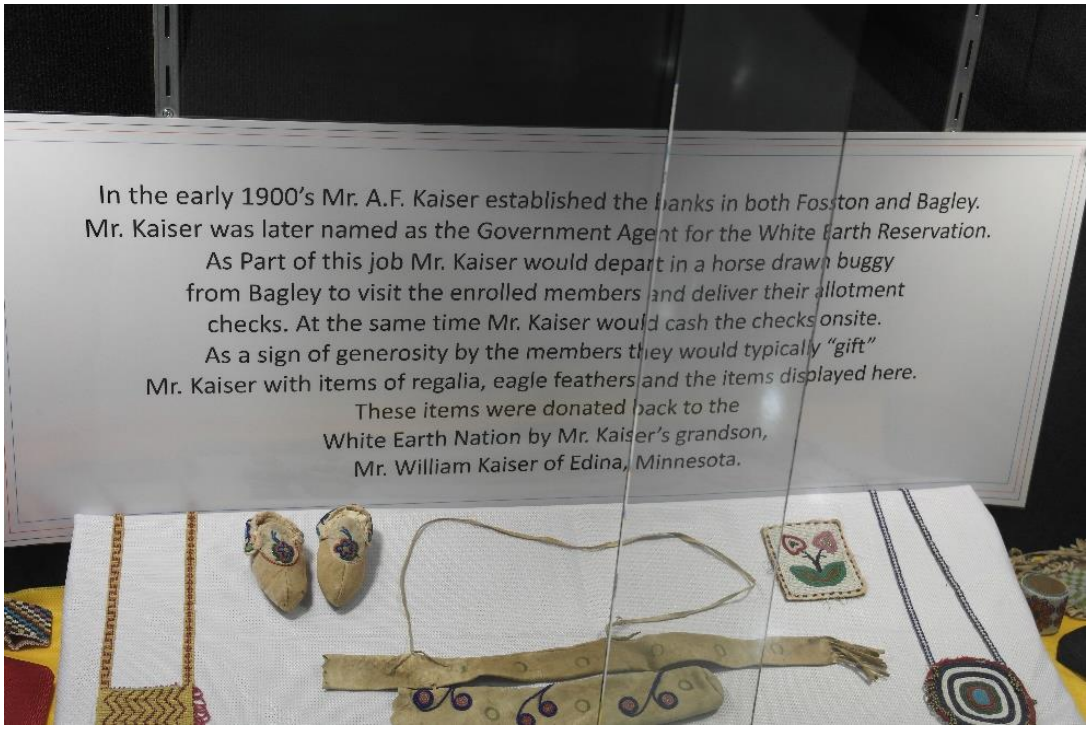

Figure 29. Kaiser Collection display; White Earth RTC

Several other objects had display cards that, while relatively basic in the information about the object, did include a language component: the object was named in both English and Anishinaabe, an extremely important inclusion for decolonization. This can be seen in Figure 30.

Figure 30. Ojibwe language inclusion; White Earth RTC

Many of the objects included in my data set can be seen on display at the RTC building. By putting photographs of these objects on display side-by-side with the 3D images I created in this project, it is quickly apparent how much more information can be gained by the 3D images:

Figure 31. Side-by-side comparison of beaded gauntlets: on display (left) and 3D image (center and right); White Earth RTC

6.3 The Benefits of the 3D Images and Online Format

While the Bois Forte Heritage Center and the cultural heritage displays at the White Earth RTC are a necessary step in the right direction to Indigenous nations possessing, preserving, curating, and displaying their own cultural heritage objects, there are several areas where the traditional methods of museum displays have failed to present these objects in a culturally appropriate way. This project presents an alternative way to display items that I believe is more culturally appropriate as well as being more easily accessible to band members and other interested parties.

The first thing that this project does is remove many of the barriers to access. The objects in this data set can be viewed and interacted with from the comfort of one's own home (with an Internet access) or from a local community center (with an Internet access). This means that

band members without transportation, with health disparities that make them homebound, with jobs during operating hours, and many other issues, can now view their cultural heritage objects on their own terms, which, again, is an important step in improving equality of access

The next thing accomplished in this project is removing the physical barrier of a display case, which creates glare, prohibits viewing of the multiple facets of cultural heritage objects and physical interaction with objects, and is a manifestation of control: the objects on display are controlled by an agency, which is in essence controlling that historical narrative. While these objects still cannot be physically held and moved by band members, they at least can manipulate the digital surrogate in a way that mimics real life, which allows them to view every detail of the object and come to their own conclusions about whose hands stitched it or whose community it came from. As Mudge, Ashley and Schroer (2006:1) note, these "digital surrogate archives remove physical barriers to scholarly and public access and foster widespread knowledge and enjoyment of our ancestor's achievements."

Another accomplishment of this project is that the online display format encourages community interaction and comment. While these objects have 'digital display cards', the information included is basic – specifically, it is as the White Earth collections records have them written. Presenting this information and providing a way for visitors to comment online opens a digital dialogue where viewers can come to their own conclusions about the objects based on their historical narrative and the oral histories they have acquired. The ability to comment on these objects fosters and facilitates the spread of knowledge. The current RTC and Heritage Center displays have, at best, a comment card that visitors can fill out, although this does not allow for an actual conversation to take place.

Chapter 7: Limitations

This project serves as an excellent starting point for those looking to use online and open source computer and imaging programs ideally suited for cultural heritage preservation and display. While there are many things that I believe were successful, there is always room for improvement and the project certainly has its limitations.

One of the original goals of this project was that there would be a community voice through interviews with community members. Despite much enthusiasm for the project from community members, eliciting participation was difficult and, eventually, not possible. Early in my research, I had two interested participants that had agreed to work with me. Shortly after the approval of my project from the tribal council, a change of power took place. This unfortunately and through no fault of my own, caused my project to be associated with the previous chairperson who had approved it. Unanticipated, one of my participants rescinded their participation. My second participant, an elder and mentor of mine, was battling a disease that eventually won out, and the elder walked on. Following this, my attempts to gain community participation were unsuccessful. Zimmerman (2005) mirrors the issues that I faced in gaining the trust and participation of community members in his own work:

> What might seem to be minor regarding informed consent, but can be a real problem in descendant communities, is the way informed consent is documented. IRBs demand a paper trail, which usually means an informed consent document filled with legal-sounding terminology. For traditional communities my experience is that informed consent documents cause no end of trouble, but IRBs don't understand this. The problem may start with the fact that many in traditional communities don't read, and even if a document can be read to them, convoluted 'legalese' is intimidating! In addition, many Indigenous communities simply don't know how to handle the whole process of a researcher actually asking permission because it is an unfamiliar experience. [2005:304]

The nature of gaining permission from community members to interview them for research presents a barrier to researchers and while it is necessary and important to document this permission, it also serves to discourage participants. Because I could not engage participants, my project failed to incorporate key components that I originally had planned to include: Anishinaabe language incorporation, oral history and stories, and personal narratives. In failing to do so, the 'community voice' aspect of this project is sorely missing. This barrier to research is not uncommon when working with descendant communities (Deloria Jr. 1988, 1997; Martine 2003; Zimmerman 2005) and is often a two-way street: researchers find it difficult to solicit participation and Indigenous people feel as though their narrative is being excluded. Gaining the trust of a descendant community can be difficult, even for Indigenous community members conducting research. This goes back to the way in which researchers are viewed when they enter a community; even with the best intentions, archaeologists, anthropologists, and historians have created negative research legacies among descendant communities:

> Many descendant communities, and not just those of Indigenous people, feel victimized by an archaeology that doesn't speak to their needs. Archaeology can make a community's past intractable through jargon and lack of access. In packing up our things, and going away to our ivory towers, we claim their heritage, we usurp their voice (Zimmerman 2001), and we get paid bundles for it, compared with what they earn! We can speak of the past as a cultural resource that is a public heritage and ourselves as being accountable to the public, but, in structural contradiction, we tell others and ourselves that we are the stewards of the past. [Zimmerman 2005:307]

It cannot be stressed enough that collaboration on research within a descendant community is of the utmost importance since it ensures that appropriate representation occurs within the project. If this kind of collaboration cannot be achieved, the research may find itself positioned alongside previous works that are considered to have failed to produce an authentic

Indigenous voice. Despite not being able to include community members in this project, I feel that by working with a community member to choose the objects in my data set (the White Earth THPO), I have at least chosen items that have cultural significance to the band members.

The website that I used to create my virtual exhibit works well with the project in its current form. However, had I been successful in obtaining a community voice, the inclusion of those interviews may have presented a challenge. When uploading my 3D models, I had only the option to include a written description, with a limited character count. This would have made inclusion of lengthy stories or personal narratives nearly impossible. There was also no option to include any type of digital recordings, such as would have potentially arisen during interviews (pronunciation of cultural heritage objects in Anishinaabe, for example). To include those particulars, I would have needed to spend much more time researching websites and databases to use, and may have also had to face a cost associated with such a venture – something that a Indigenous nation with a limited budget may have also had difficulties facing.

Chapter 8: Future Directions and Conclusions

As I have stressed from the outset of my project, its purpose was to create a starting point for Indigenous nations to take control of their own cultural heritage and historical narrative through a contemporary method of preservation and display that brings together elders and members of the younger generations. Carried out on a small scale, what I was able to create has been very effective. However, for Indigenous nations that may have many more cultural heritage objects in their collections, some changes will need to be made. Notwithstanding, this project sets a firm foundation for Indigenous nations to build upon and continue in a manner that suits their individual needs.

One of the first things that would bring this project to a new level is to create 3D models of an entire collection rather than just a few select objects. Depending on what objects are found within a collection, a different type software may be necessary, as certain surfaces and textures were difficult to work with when using the 123D® Catch. A nation with a larger budget for cultural heritage preservation and display may be able to afford to purchase a device that will create the 3D models (such as the NextEngine table top scanner), as well as hire and train staff to use the device. Nations with fewer financial and staff resources for cultural heritage preservation and display can still include many more of the objects within their collections using this same software but may have to eliminate certain objects that do not lend themselves well to the creation of 3D surrogates. By expanding the data set, band members and researchers will still gain a clearer picture of the material cultural history for a group of people, likely spanning a much larger timeframe than was presented in this project.

While the website used to create the virtual exhibit does not have a limit on how many 3D models one can upload for the basic free version, it does have the limitations discussed

above: inability to include recordings and limitations on the length of descriptions. By upgrading to the alternative versions, the website does unlock the ability to include longer descriptions but the inclusion of recordings is still not an available feature. Further research into databases and websites that allow for the integration of voice recordings would take this project in a direction that allows for a more complete inclusion of community voice. Many Indigenous nations in the United States and Canada have their own community websites; therefore, it may be possible to work directly with the IT specialists for the Indigenous nation to create a unique site that is incorporated into the tribal website as a virtual exhibit. Again, budgetary constraints are going to be major determining factors in what each Indigenous nation might be able to accomplish.

Tribally-initiated projects similar to this project may face the same problems that I experienced when it comes to soliciting community participation. However, it is equally possible that a project that is initiated from within the community, by the Indigenous nation, would have higher instances of successful community participation because of the trust that likely already exists within the community. Including this community voice aspect will bring the project to a whole new level, giving each community within the nation a say in the presentation of their history, something that is often glossed over when carried out at a county, state, or federal level. Each Indigenous nation will have their own unique needs, but as a suggestion, it would be beneficial to include a community member from each of the key communities or villages so that no one feels excluded (for example, White Earth has about 10 principal communities). This community participation has yet another component that would be useful: by bringing the finished product into communities (community centers, schools, local museums,

etc.) the researcher or Indigenous nation can gauge its effectiveness through further interviews or surveys.

County, state, and federal institutions continue to possess many Indigenous cultural heritage objects. These objects could be photographed and the resulting 3D models could be either added to an Indigenous nation's own digital repository, or new virtual exhibits could be formed as collaborations between Indigenous nations and these institutions. This would make larger numbers of cultural heritage objects available to stakeholders, while again, removing the barriers to access that they currently face in viewing them. There are some institutions who have taken steps in this direction, but what they lack is the community voice aspect: objects continue to be presented in an etic perspective rather than an emic one; however, this could be solved by working directly with descendant communities.

8.1 Final Thoughts

The White Earth Nation of Minnesota presented a unique opportunity to work with a nation that was actively attempting to engage its community members in their own history at the onset of my project. With its relatively small collection, it served as an ideal pilot project to establish a framework for how to carry out this kind of work.

Utilizing the appropriate museology and communities of practice approaches, this project was carried out in a way that was meaningful and replicable within descendant communities, taking into consideration their own unique needs, perspectives, desires, and resources. These theoretical frameworks make this project one that is easily replicable and obtainable to other nations seeking innovative ways to preserve and display their own cultural heritage.

Focusing on a small data set for this project allowed me the opportunity—through trial and error—to discover the benefits and limitations of my chosen method of creating the 3D images and uploading them. If my chosen data set had included more cultural heritage objects, the time I would have needed to allow for creation of the 3D images may have prevented me from being able to produce the high quality images I did. The data set, while small, includes a nicely varied group of objects that illustrate the strengths and weaknesses of the 123D® Catch program, which will be useful to researchers and nations looking to utilize it for their own projects. The data set also provides detailed insight into the material culture of the White Earth Nation through a variety of artistic styles, mediums, and cultural heritage object types.

The use of photogrammetry for this project allowed me to capture more precise detail than I believe I would have accomplished by using a more expensive method for creating the 3D images, such as the NextEngine table top scanner. By reviewing my photo sets and seeing the image during the 'stitching' process, I could determine relatively quickly if enough information was gathered during the photogrammetry process or if I needed to expand my photo set. This also did not put limitations on the size of the cultural heritage objects that I could include – a consideration that would have been necessary if using a 3D imaging machine.

The AutoDesk© program was user-friendly and could be utilized in a variety of formats that made it more accessible. This flexibility and ease of use makes the program a more viable option for replication than other expensive options that would require lengthy training, costly purchases, and fewer usable formats. The website used for this project, Sketchfab©, had similar user-friendly features that made the two work very well together. The built-in VR capabilities of both programs make them extremely effective as more and more people venture in the realm of VR and purchase their own headsets for home use.

Many other projects have utilized the 3D models, virtual museum exhibitions, and VR capabilities that are available for researchers. The projects that Dawson and Levy (2004, 2006; Dawson et al. 2011) completed positively demonstrated how Indigenous communities interacted with these kinds of virtual exhibits and what insight could be gained from them when compared to the traditional brick and mortar presentation of physical museums. Their work using this technology with Inuit communities to bridge the knowledge gap between elders with oral history and the youth with technological knowledge was extremely insightful. The Inuit3D project was an early example of utilizing 3D models to create a virtual museum that was very effective in that it successfully removed many of the barriers to access that I feel Indigenous people face with traditional museum displays. All of these published works serve to set a firm foundation for future projects, including mine. The Hearst Museum basket collection details how cultural heritage objects are often sought after by researchers but gaining permission to access them can be difficult (Isler, Wilson, and Bajcsy 2006). By creating 3D models for this large collection and placing them in an online format, researchers and stakeholders found themselves with much greater ease of access to the cultural heritage objects.

Despite the successes I feel this project had, its limitations must be acknowledged. Without the participation of willing community members, the community voices that I had desired to include in this project are missing. This also means that I have not been able to include Anishinaabe language or oral history components. By choosing low-cost options for creating my 3D models and my virtual museum, I have limited some of what can be presented: models do not include bottom surfaces and are limited to those that can be successfully photographed through photogrammetry. The virtual museum has a limited character value for descriptions and does not have the ability to include recordings, had any been obtained.

However, I do believe that this project still sets a good starting point for future projects expanding on this idea. It presents a baseline for data collection, 3D model creation, and virtual museum curation. Obviously, one area in which future projects could improve on this project would be to expand the data set to include all cultural heritage objects within a Nation's holdings. Another addition would be a different virtual museum program that allowed for longer descriptions and recordings to be included. Successful collaboration with community members to solicit participation in a future project would be a necessary and vital component to make this project more successful. Finally, collaborating with institutions on county, state, and federal levels to include relevant cultural heritage objects within those collections would extend this project into a wider realm of cultural sovereignty and digital knowledge repatriation. As Dawson, Levy, and Lyons (2011:396) write, "the use of virtual and augmented reality, especially when experienced in 3D, might be powerful tools for repatriation indigenous knowledge to indigenous communities."

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Appendix

This appendix contains copies of the necessary certifications and permissions obtained through the JFREB to work with participant community members, as well as the information flyer that was released in communities to locate interested participants. It also contains the Memorandum of Understanding (MOU) that was submitted to the White Earth Nation tribal council to obtain the necessary permission to conduct research on the cultural heritage objects within the White Earth Nation collections.

I. Tri-Council Policy Statement certificate of completion for the Ethical Conduct for Research Involving Humans Course on Research Ethics

UNIVERSITY OF MANITOBA | Research Ethics and Compliance
Office of the Vice-President (Research and International)

Human Ethics
208-194 Dafoe Road
Winnipeg, MB
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Phone +204-474-7122
Fax +204-269-7173

APPROVAL CERTIFICATE

March 4, 2015

TO: **Larissa Harris** (Advisor B. Milne)
Principal Investigator

FROM: **Susan Frohlick, Chair** [redacted]
Joint-Faculty Research Ethics Board (JFREB)

Re: **Protocol #J2015:011**
"The White Earth Digital Tribal Museum: Creation of an Open-Access Online Museum Using 3D Images of Cultural Heritage Objects"

Please be advised that your above-referenced protocol has received human ethics approval by the **Joint-Faculty Research Ethics Board**, which is organized and operates according to the Tri-Council Policy Statement (2). **This approval is valid for one year only**.

Any significant changes of the protocol and/or informed consent form should be reported to the Human Ethics Secretariat in advance of implementation of such changes.

Please note:

- **If you have funds pending human ethics approval, please mail/e-mail/fax (261-0325) a copy of this Approval (identifying the related UM Project Number) to the Research Grants Officer in ORS in order to initiate fund setup. (How to find your UM Project Number: http://umanitoba.ca/research/ors/mrt-faq.html#pr0)**

- **if you have received multi-year funding for this research, responsibility lies with you to apply for and obtain Renewal Approval at the expiry of the initial one-year approval; otherwise the account will be locked.**

The Research Quality Management Office may request to review research documentation from this project to demonstrate compliance with this approved protocol and the University of Manitoba *Ethics of Research Involving Humans*.

The Research Ethics Board requests a final report for your study (available at: http://umanitoba.ca/research/orec/ethics/human_ethics_REB_forms_guidelines.html) **in order to be in compliance with Tri-Council Guidelines.**

II. Joint Faculty Research and Ethics Board certificate of approval for thesis research

RESEARCH OPPORTUNITY FOR COMMUNITY MEMBERS:

Looking for community members 40 years and older who would be interested in contributing to a research project. This project is intended to make cultural history more accessible for community members. If you have knowledge of oral history, traditional stories, Anishinaabe language, or cultural artifacts and would be interested in participating or would like more information, please contact:

Larissa Harris

University of Manitoba Masters Student, Department of Anthropology

[redacted]

Or

[redacted]

III. Informational flyer posted in tribal communities of White Earth Nation

Larissa Harris
[redacted]

To Whom It May Concern:

My name is Larissa Harris and I am a master's candidate with the University of Manitoba-Winnipeg. I am currently working on my thesis research, titled the The White Earth Digital Tribal Museum: creation of an open-access online museum using 3D images of cultural heritage objects. This research is a pilot project that will create 3D images of complete cultural heritage objects in the tribal collections of the White Earth Band of Ojibwe in Mahnomen County, Minnesota, USA. Using a handheld digital camera and free 3D imaging software available online, this project is designed to create conditions which can be replicated by others hoping to preserve cultural heritage in tribal collections with limited financial resources. The project has three main objectives: (1) creating digital surrogates of complete cultural heritage objects in the tribal collections of the White Earth Band of Ojibwe for preservation purposes; (2) provide easier access to cultural heritage for band members, educators, and interested members of the public; and (3) facilitate traditional oral history and oral teaching methods from elders in a format that the younger generation is more familiar with. I will carry out this project by taking a series of photographs for each complete cultural heritage object, uploading the images into the 3D software to create a 3D image, creating an online museum format to upload the images into, and, interviewing community elders to obtain stories relating to the objects, which will be linked to the 3D images.

This project has received approval from my thesis advising committee (contact information attached). I will be using 20 objects within the White Earth Tribal collections (file attached) that have been chosen through discussion with the THPO Cayla Olson. The photographing of these objects will take place within the RTC building and objects will not be leaving the premises. The rights to these photos will remain the property of the tribe. These

photographs will be uploaded into open source software called 123D Catch to create the 3D images; these images will also remain the property of the tribe, although credit for the creation of the objects via the software will be identified. With the assistance of the IT department, a museum website will be created and these images will be uploaded into the platform for display. I will then interview volunteers from within the communities regarding the images; the information I am seeking includes Anishinaabe terminology for objects, stories about specific objects, stories about use of objects, stories about manufacture of objects, or stories relating to the history of objects. For this process, I have received Joint-Faculty Research Ethics Board approval to conduct interviews. All volunteers will have the option to pass on viewing or being interviewed about each object at their own discretion and will have the ability to withdraw consent at any time during the project and not be included in the final product. Participants will also have the choice between being audio-recorded or having interviews transcribed, per their discretion. These interviews will then be linked to the object images so that visitors to the museum website can have an interactive experience when viewing them. All rights to the museum remain the property of the tribe.

Any questions, comments, or concerns can be directed to me through either email or telephone. I look forward to working with the White Earth Nation for this project!

Nya:weh,

Larissa Harris

IV. Memorandum of Understanding (MOU) submitted to and approved by the White Earth Nation tribal council for research