

**The Sacred and the Digital:
Managing Heritage in an Open Access World**

by

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B.A. (Anthropology), University of British Columbia, 2011

Thesis Submitted in Partial Fulfillment of the
Requirements for the Degree of
Master of Arts

in the
Department of Archaeology
Faculty of Environment

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SIMON FRASER UNIVERSITY

Summer 2017

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Abstract

While the mantra of “free information” is often heard in online communities, concerns over privacy remain a point of contention. Indigenous communities wishing to use heritage digitally may find difficulty reconciling the benefits of digital platforms with traditional protocols governing how information should be shared. This research examines the strategies employed by five First Nations in British Columbia to incorporate heritage into information management systems for Nation operations. I do this through a series of interviews with members, staff and contractors of the participating Nations who have been involved in the selection and use of these platforms. The questions asked focus on the challenges of finding suitable software, and the needs for improvement in both software function and user experience. I conclude that the greatest barriers to creating software environments suitable for sensitive heritage lie not in technological capability, but in social dynamics between software developers and communities.

Keywords: digital heritage; content management systems; Indigenous software; intellectual property; digital sovereignty; Indigenous heritage

Acknowledgements

My thanks to the communities and individuals who agreed to participate in this research.

From the Tsleil-Waututh Nation: thank you to Adrienne Morrison, who cheerfully agreed to be first in the door, and patiently answered my questions as I was still working out the interview process. Thank you as well to Michelle George for sharing her expertise and perspective as both an employee and member of the Tsleil-Waututh Nation.

From the Squamish Nation: thanks go to Lisa Wilcox for relaying her experiences, both the good and the bad, and for putting me in touch with Brandon Thompson. Thanks as well to Bill Williams for sharing his wisdom and visions for the role of digital technologies in preserving Squamish knowledge.

From the Stó:lō Nation and the Stó:lō Research and Resource Management Centre: a heartfelt appreciation to Tia Halstad, who walked me through the process of the Research Registry not once, but twice, and gave me a wealth of information during our interview, assisted by Michelle Tang who I would also like to thank. Thank you as well to David Schaepe who took considerable time from his busy schedule to discuss the fascinating and complicated world of digital heritage, and to Sonny McHalsie, whose knowledge and storytelling skills made our interview a delight.

From the Tsawwassen Nation: thank you to Jennifer Jansen for responding to an out-of-the-blue email and kindly inviting me to come chat in her office on a topic she had presented on many months prior.

Gratitude to Amber Ridington for hosting me at her home for a record-breaking three hours, and taking me through the wild and wonderful world of open-source content management systems, her knowledge of which is staggering.

Warm thanks to Brandon Thompson, who provided a delight of an interview that felt much shorter than the ninety minutes it took, and gave me some wonderful sound bites to work with.

Thank you to Sandra Dunkin, whose reappearance in my life and integral part in completing this research proves that it is, indeed, a small world after all.

Deep appreciation goes out to my committee: my supervisor Ross Jamieson, who guided me through three prospective thesis topics, keeping good humour and optimism through each one; Sue Rowley, who readily agreed to serve on my committee and share her expertise in a topic I needed much guidance to broach, and George Nicholas, whose part in guiding my research (as well as my degree as a whole) gave me just enough existential crises to keep me on the right path.

Thank you to Rudy Reimer/Yumks for taking an interest in my research, and making the necessary introductions to ensure the inclusion of participants from the Squamish Nation.

This thesis would not be possible without my friends in the Department of Archaeology – shout-outs in particular go to Alexa Walker, who proved that no setbacks are permanent, and my comrade-in-arms Eric Simons, a constant source of support through even the most difficult of times.

Thank you to my parents, who have been nothing less than encouraging, despite my decision to seek my education on the other side of the continent.

This thesis was funded in part by the Alexia Sepideh Kiaii Memorial Endowment Fund, and I personally thank the Kiaii family both for their generous donation, and for sharing with me stories of Alexia and her love of travel, culture, and archaeology. I hope that this thesis does its part in honouring her memory.

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Terminology

Throughout this research, I refer to Indigenous peoples, by which I mean the original inhabitants of lands who experience marginalization by a dominant settler population. While such language can overly generalize the political, cultural, and historical nature of group identity, for the purpose of this research it is a convenient shorthand. I include discussion of regions where different terminology is more commonly used (such as the Aboriginal peoples of Australia); in these instances I refer to the more specific, self-determined names for such cultural groups (e.g., Waramungu, Anangu). The research I have personally conducted has all taken place within British Columbia; when I refer to the participating sovereign communities as a whole, I use the term “First Nations.” At the community level, I use the specific name of the governing entity.

Chapter 1.

Heritage 2.0

Over the past several decades, digital technologies have increasingly found their way into nearly every aspect of modern life. Renewing a library book, purchasing groceries, or even finding potential romance can be done with a few taps on a smartphone. Online platforms such as discussion forums, messaging applications, and weblogs have made a lasting impact on how we interact with the world. Social media sites enable people to share and connect across the globe. The increase in access to information, whether through news sites, Wikipedia, or online academic journals, means that it has never been easier to stay informed on a multitude of topics.

This “information free-for-all” is not without its drawbacks, however. The speed of online dissemination means information that is sensitive, unverified, or untrue can quickly and irreversibly spread. One need only look at the political tensions resulting from the WikiLeaks cables leaks (Ryan et al. 2010) and the alleged effect of false new stories on the 2016 US presidential election (Bailey 2016) to see possible ramifications of information exchange on the Internet. While data security measures are an important aspect of the online and digital information experience, these are generally framed in terms of legal ownership and personal privacy. With the exponential effect of globalization enabled through online connectivity, this attitude towards information ownership and dissemination has quickly become the dominant one.

Curious-minded users of the Internet can easily access information about cultures around the world through information repositories such as Wikipedia. Heritage institutions that have traditionally relied on physical visitors to disseminate information have also embraced the digital revolution, utilizing websites, virtual exhibits, and 3-D technologies to draw in visitors both physically and remotely via the Internet (Geismar 2012; Isaac 2008; Newell 2012; Richardson 2013). However, disseminating information

about other cultures, particularly without input from the people of that society, has been a contested practice in such institutions (Boast 2011; Enoté 2015; Krmpotich and Peers 2013). This, coupled with the easily anonymized nature of contributing and accessing information online, can result in sensitive cultural information being shared inappropriately, and with little accountability. Harry Potter author J.K. Rowling shared her history of magic in North America via the Pottermore website¹. In addition to portraying pre-contact Native Americans as primitive and superstitious, suggesting a primal connection to magic, she draws on Navajo stories with traditionally strict sharing protocols to give her setting verisimilitude (Keene 2016). The weighted volume of representation also impacts perceptions of Indigenous culture. Based on the sheer volume of representation on social media platforms, one might assume that feathered headdresses originated at outdoor music festivals. Sources that provide the cultural and historical context to these ceremonial ornamentations, particularly those in the words of their originating communities, are by contrast less prevalent and take more time to absorb and disseminate.

A common manifestation of this is cultural appropriation, wherein a cultural expression is lifted without consent from its source community and used inappropriately for something other than its original purpose (La Salle and the IPinCH Commodifications of Cultural Heritage Working Group 2014). Cultural borrowing is an inevitable result of multiculturalism, and is not inherently problematic. However when a dominant cultural group appropriates from a marginalized one, it can negatively impact the source community by presenting the information in an inappropriate or misleading manner such as the Kwakwaka'wakw "cannibal" dance, misconstrued as a literal act of cannibalism (Fee 1999), by commodifying heritage, leading to a devaluing of traditional expression (Coombe 1998:239), or even causing spiritual harm to the community and their cultural values (Lai 2014:13). Self-determination is a core component in the process of decolonization (Smith 2012:120), and part of the struggle in the self-determination of Indigenous peoples is to "make places" for non-Western viewpoints in hegemonic spaces (Baloy 2011:528), allowing these communities to decide if and how their heritage is shared with the world.

¹ <https://www.pottermore.com>

In this thesis I examined the apparent tensions between the global culture of open-access information and the rights of Indigenous communities to safeguard traditional knowledge and heritage. While there is a long and lamentable history of the seizure and misuse of Indigenous culture, and digital technologies make the appropriation of intellectual property all the easier (Anderson and Christen 2013a; Hesmondhalgh 2006; Jones 2009), the modern-day Digital Age is not necessarily incompatible with the appropriate treatment of cultural expression. Indeed, the use of such technologies may be necessary for many communities in their daily operations, and can facilitate the preservation and safeguarding of heritage going forward. My aim was to explore this perceived binary and examine the degree to which heritage is or is not incompatible with existing digital information management. I achieved this by engaging with multiple First Nations in British Columbia who use software in their management of heritage resources and information. By surveying the individuals who operate these technologies, I highlighted the areas of digital spaces that benefit heritage management, impede it, and suggest where there is room for improvement in the intersections of culture and digital technology.

Grasping the Intangible

“Heritage” refers to the objects, places, knowledge, practices, and other forms of expression shared among a community and through generations that promote group identity, perspective, and well-being. It is a tautological concept, as it is the ascription of the cultural value that defines it (Welch and the Intellectual Property Issues in Cultural Heritage Project 2014). Heritage is the recognition of the importance of an object or practice to cultural identity, and through this assignment of value, items are transformed into heritage (Machuca 2013:58). A family may consider a silver knife passed down through three generations a piece of heritage, but the dollar store cutlery in the same drawer is not. However, as Smith (2006:11) asserted, “there is, really, no such thing as heritage,” meaning that the nature of heritage is not in physical items, but in the ideas and practices surrounding cultural expressions. Though heritage discourse often treats intangible heritage as a subtype of heritage (Lipp 2013; Arizpe and Amescua Chávez 2013; United Nations 2003a), in a sense all heritage is intangible as it is a collection of values and meanings ascribed to “things”. For the purpose of this study, I will make the

distinction between physical objects with heritage value, and intangible heritage as the cultural expressions, knowledge, and skills pertaining to a cultural group's worldview and identity.

Like tangible objects, intangible heritage requires caretaking to ensure that it can be passed down from generation to generation. Intangible heritage in some sense must be "performed" for its values to be transmitted (Lipp 2013:138), whether through instruction, storytelling, or other means of communication. The United Nations (2003a) has recognized the importance of safeguarding such cultural expressions, though it charges nations with this responsibility, stating that "Indigenous communities, groups and, in some cases, individuals, play an important role in the production, safeguarding, maintenance and re-creation of the intangible cultural heritage." This was further expanded upon with the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), which asserted that Indigenous peoples have "the right to maintain, control, protect and develop their cultural heritage, traditional knowledge and traditional cultural expressions" (United Nations 2008:11).

Digital heritage requires management as both heritage and digital information. Digitization, the act in which information is transformed into the binary code that comprises digital data, greatly increases the modes of replication and transmission of information, both important components to the preservation of intangible heritage (Pratt 2013:79). The lack of clear guidelines on how heritage should be handled in digital spaces, however, coupled with the increased accessibility of information through the Web, means that without careful security measures, heritage information placed online can easily be accessed, duplicated, misrepresented, or shared without the consent of its originating community².

² The use of the term "community" can be problematic in that it suggests a homogenous group of people with a single perspective. In this thesis, I use the term to refer to the direction and stance of the community directed by its recognized leaders, while acknowledging this can not adequately encompass the different voices and opinions comprising a single community in actuality.

Local Needs in a Global Context

Many Indigenous groups have embraced the digital revolution as a way to communicate both within their communities and to the world through digital research repositories (Bohaker 2005), community archives (Christen 2006), digital libraries and knowledge bases (Hunter 2005; Leopold 2013), and virtual exhibits (Srinivasan et al. 2009). However, communities bounded by common culture and history may find difficulty reconciling the benefits of digital platforms with traditional protocols governing how cultural information such as visual and audio recording of ancestors, and the locations of sacred sites should be shared. Software designed for general information management may not readily incorporate access rules based on specific cultural privileges such as gender, family, or spiritual role.

Examining the ways in which traditions can be maintained and respected while navigating digital worlds is an important step to a global digital presence and opens lines of communication and collaboration both within and between cultural groups. Available solutions for heritage management in use by archaeologists, museums, archives, and other heritage specialists may meet some of the needs of communities that currently use them. However, it is unclear to what degree these platforms satisfactorily allow for cultural protocols that govern how heritage is represented and accessed. Such shortcomings may deter other communities from engaging in digital heritage management entirely, as the potential for heritage mishandling is too great a risk to commit to the digital realm.

Despite the potential for misuse through unauthorized and inappropriate access, there is an appeal to using digital information management for many communities, including Indigenous ones. For some, it is a necessary process for handling large volumes of data, particularly when working with external organizations that have also adopted digital systems. Communities with land referral departments can receive hundreds of requests from external proponents annually, and they are increasingly in digital formats. Digitization also offers additional modes of preservation and dissemination, which have direct implications for heritage management practices and the preservation of intangible heritage. The creation of digital surrogates, such as 3-D scans of objects and MP3 files of oral histories, brings up questions of cultural authenticity, as

there is little consensus on the degree to which the ownership (Isaac 2011), social value (Were 2015), and circulation of knowledge (Becvar and Srinivasan 2009) of heritage translates to digital surrogates. However, such processes add some insurance that even if the original object or expression is lost, knowledge pertaining to it still remains.

Digital forms of communication also offer communities opportunities to share information both internally and with a more public audience. Just as museums and archives now have options to display their collections online, so too have some Indigenous communities chosen to share aspects of their history and culture virtually. Online tools also have potential to connect diasporic members of Indigenous communities to heritage through virtual exhibits such as the Inuvialuit Living History site³, or to serve in cultural revitalization efforts to reach the more digitally-oriented youth, as with the FirstVoices language toolbox⁴. Understanding how Indigenous peoples use these technologies to manage heritage, using digital records to inventory, track, and disseminate information about heritage, and what shortcomings current options have, can greatly improve the agency these communities exercise in preserving and utilizing such information.

Software designed for organizing data files can facilitate the creation and maintenance of a digital database or catalogue. A content management system (CMS) is a type of program used to manage digital content. Similar to database software, these programs offer dynamic ways to describe, manage, and interact with data. Content management systems like the web-based Wordpress platform manage digital files for the purpose of online publication and collaborative work, and software options exist across many different industries for both online and offline file management. Museums, libraries, and archives use a specialized type of CMS known as a collections management system to facilitate the digital records pertaining to their holdings.

For many prospective users, the selection of a suitable CMS platform may come down to programming language, supported files and software, or cost. The number of open-source and proprietary platforms in use is extensive, with options to fit most

³ <http://www.inuvialuitlivinghistory.ca>

⁴ <http://www.firstvoices.com>

combinations of these needs. However, content owners who wish to manage information in accordance with traditional knowledge practices may find options more limited. With many Indigenous communities practicing strict protocols for the nature and scope of sharing cultural information, identifying programs that allow protocols to translate into digital format while also addressing technical and practical needs may prove challenging.

The challenge facing Indigenous communities seeking software that accommodates a traditional knowledge base lies in the trend of software to be globally applicable rather than locally responsive. The broader the base of prospective users, the larger the potential profit, so appealing to a common denominator is a logical business strategy for software developers. More specialized platforms with less potential buyers may in turn be more expensive and less user-friendly. Individual communities using these management tools face difficult decisions in both selecting a software package and determining how it will be implemented for heritage management.

Research Purpose and Methods

The overall goals of this thesis are to determine 1) what aspects of modern content management software and its development help facilitate Indigenous heritage management and 2) what aspects are deterrents in relying on such technologies. Examining the benefits and drawbacks of digitizing potentially sensitive cultural information helps to illustrate potential challenges facing communities that wish to use such software for heritage management needs.

My research is structured around three central research questions:

- 1) What options exist for descendant communities to preserve and share aspects of their cultural heritage and history digitally, and how do their features compare to each other?**

- 2) How do cultural protocols affect Indigenous communities' willingness and approach to digitizing heritage?**

3) How can software developers better work with communities to create solutions that allow information to be shared while respecting protocol?

This research operated on the assumption that software is largely designed for a Western audience, without easily accommodating usage falling outside the expected patterns. Therefore, incorporating unique rules for how information is managed and accessed may prove challenging in using off-the-shelf software. By engaging with individual communities that manage heritage information digitally, I observed the ways and extent to which these users adapt software to meet their needs, or create new protocols for governing how this information is handled to be compatible with the software. The synthesis of this research is a list of recommendations for improving the environmental of information management for Indigenous heritage. This includes both technical recommendations for improving the functionality of the software itself, and the social dynamics that exist between those that create and consult on software, and the Indigenous community users.

To address these questions, I conducted two studies: 1) a survey of several CMS platforms with viable use for heritage management, and 2) a series of interviews with members and employees of five First Nations communities in British Columbia, using a semi-structured/conversational format to identify current challenges and opportunities for digital solutions to heritage management. The CMS platform survey demonstrates what the marketplace for management software looks like, and the decisions facing Indigenous communities looks for a heritage management solution. As the survey contextualizes the interview framework by assessing how different features may affect the selection process and use of a platform, it is presented before the methodology and results of the interviews. By assessing the suitability of existing software options and speaking with community representatives with a range of experience in CMS programs, I produced a sampling of the current attitudes towards digital heritage management in Indigenous contexts. From this study, I suggest strategies for both software developers and users to improve how CMS platforms are designed and implemented for heritage management purposes. These strategies include both technical features, and changes to the social dynamics between developers, Indigenous communities, and other outside collaborators.

Research Setting and Context

The particular history of colonialism in British Columbia and its legacy for modern day First Nations carries implications for the role and potential for digital information management by Indigenous communities. Until the 1990s, the government of British Columbia refused to partake in treaty negotiations, only recognizing the two treaties signed in the nineteenth century. Without treaties in place, the provincial government did not recognize Aboriginal rights and title outside of reserve lands. The treaty negotiation processes established in the past two decades has only seen three treaties finalized, with dozens of others stalled at the table (Egan 2013:33; Morgan and Castleden 2014:2). As such, much of the recognition of Aboriginal rights and title in British Columbia has been established through court cases.

The landmark cases of *Calder et al. v. Attorney General of British Columbia* (1973), *R. v. Sparrow* (1990), and *Delgamuukw v. British Columbia* (1997) set precedents for establishing if and how Aboriginal rights and title can be enacted within British Columbia. More recently, the ruling in *Tsilhqot'in Nation v. British Columbia* (2014) affirmed that title can exist even without a treaty in place, and that the provincial government has the obligation to consult “in good faith” with First Nations asserting title over land under consideration for alterations (Alcantara and Morden 2015:64). However, while these precedents offer First Nations opportunities to assert rights and title, there is still a burden placed on these nations to both prove historic claims to traditional territories, and to respond to these consultation requests if title has been established.

In an age where information can be quickly produced and circulated via digital management tools, First Nations dealing with the legal issues of rights and title need management solutions for the information pertaining to these cases and referrals. Provincial government departments and other proponents may place unrealistic expectations on First Nations’ abilities to compile and present relevant information, particularly if they do not have access to efficient information management tools. Thus, though my research explores the use of such technologies for heritage management, these management and repository systems also impact First Nations in British Columbia in their capacities to assert land claims and enact stewardship on traditional territory and resources.

Research Background and Disclaimer

I became interested in digital heritage management through my work at the Center for Digital Archaeology⁵, a non-profit founded by UC Berkeley archaeologists with a commitment to digital methods of recording and disseminating information. My work began with managing digital photography of archaeological excavations, which was my first introduction to born-digital data workflows, the process of creating original information digitally. While most projects focused on making information more accessible, it was my work with the Mukurtu Content Management System⁶, developed by Kim Christen would ultimately lead to this research. Described more thoroughly in Chapter 3, Mukurtu is a content management system that allows user groups to set access restrictions based on unique cultural protocols.

Through working with prospective users of the software, I became more aware of potential barriers facing Indigenous communities seeking to implement digital technologies into their infrastructure. When I first began this research, I was surprised to find that in British Columbia, Mukurtu was not in use by many First Nations, although I knew at least two had expressed interest in the platform during my tenure at CoDA. In my role promoting the software, I believed that these prospective users would quickly adopt Mukurtu, as it seemed to fill a unique niche in information management platforms. This led to the question of what software is currently in use, and why. I approached this research from an applied anthropological background, considering how the technological specifications of the different software affect decision-making and operations within Indigenous communities. This, in turn, I connected to larger issues of how heritage is perceived and handled when placed in digital formats, and how digital technology and the culture surrounding its use affects heritage information on a wider scale.

I offer an additional disclaimer for the title of this thesis, which partly came from a desire to reference Émile Durkheim, but also suggests implications on the nature of this thesis. My research does not directly deal with information of a sacred nature, as the very nature of sacred knowledge makes it both difficult and often inappropriate to access

⁵ <https://digitalarch.org>

⁶ <http://mukurtu.org>

and study, and also puts it at apparent odds with the global online trend of open and equal access to knowledge. However, understanding how Indigenous communities choose to manage information can provide insight into whether the nature of information management systems can accommodate the most sensitive aspects of traditional knowledge and heritage, particularly when access to this information is strictly regulated. Sacred teachings, ceremonies, and spaces are among the most protected of information safeguarded by communities, and are central to a community's spiritual well-being and identity. Having the option to continue this information stewardship in digital contexts is thus a form of self-determination and sovereignty at a very deep level, even if communities are selective about what information they do or do not make digital.

Thesis Structure

This chapter serves as the initial introduction to my research questions, goals, and methods. In Chapter 2, I survey the background literature that frames the overarching problems presented by the intersection of the digital and the cultural, and introduce a number of case studies that illustrate how Indigenous communities have overcome these challenges. Chapter 3 is an assessment of six CMS platforms with application for heritage management, focusing on factors that may affect their suitability for use by Indigenous communities. I discuss the methodology behind my interviews in Chapter 4, including recruitment and analysis methods. Chapter 5 presents the results of my interviews, illustrating the differing experiences of my participants in using content management systems for Indigenous heritage. I discuss the broader themes deriving from this research in Chapter 6, drawing connections between my findings from the interviews and the topics raised in the literature review. In the final chapter, I offer suggestions for facilitating the use and improvement of CMS platforms for heritage management for both prospective users and software developers.

Chapter 2.

Background

This chapter considers the issues framing the overall research focus of placing Indigenous knowledge systems in Western technologies. I do this by examining literature pertaining to relevant topics as epistemological tensions, colonialism in informational institutions, intellectual property issues as applied to heritage, and the intersections between cultural knowledge and digital technologies. Interspaced throughout the discussion, I provide illustrative examples of initiatives by and involving Indigenous communities and their heritage that resulted in a tool or project that bridged a divide between an Indigenous and non-Indigenous framework.

Even in globally connected spaces, there is typically one worldview that the majority of people subscribe to, which dictates the structure and expected behaviours that occur within it (Olsen et al. 1992). The frequently dominant Western epistemology is equated with objective, rational, and science-centric worldviews, and vetted by socially approved “experts” (Chhetri and Chhetri 2015:12). This viewpoint implicitly frames non-Western epistemologies as the reverse: lacking in reason, evidence, and plausibility. Though it is simplistic to divide worldviews into the dichotomy of Western/non-Western (ignoring the mixing and overlapping of ideas allowed through globalization), where conflicting views do exist, the dominant one is more readily accommodated by existing infrastructures and tools.

The move to digital records, databases, and other forms of information management offers opportunities to facilitate multiple expressions of knowledge. Computers are capable of processing magnitudes of data more quickly and efficiently than the analogue catalogues of the past, and thus have the potential to handle information for a variety of needs. This makes the move to digital recordkeeping a necessity in most sectors of modern life, and organizations that do not adopt this

practice may find themselves unable to keep up with the expectation of rapid information access. For Indigenous communities dealing with treaty processes, land referrals, legal proceedings, and other processes involving high volumes of data, this disadvantage has the potential to marginalize an already disenfranchised population. Though software may be capable of creating a user experience that responds to specifically non-Western use, the culture of software development itself presents some challenges that must first be discussed before looking to the solutions.

To understand the challenges faced by Indigenous peoples interacting with and within digital spaces, I first examine the historical points of epistemological conflict between Western and non-Western societies. I then identify and discuss the principle challenges that face non-Western peoples in knowledge production in digital contexts. Finally, I address the fairly new concept of digital heritage, and the challenges and opportunities that have arisen in its conception. After outlining each major topic, I provide an in-depth description of an initiative by or in partnership with an Indigenous community that attempts to reconcile these existing tensions. These projects provide more concrete examples of the epistemological challenges facing Indigenous communities working in global contact zones, and how these challenges can be overcome to provide further opportunities for heritage management.

Epistemological Integration

Indigenous peoples wishing to utilize digital tools for self-determination may encounter difficulties finding suitable platforms for accurate representation. Much has been written on the challenges of incorporating different knowledge systems, in both abstract terms and specific contexts (Aikenhead and Ogawa 2007; Chhetri and Chhetri 2015; Coutin 1995; Ermine 1995; Hart 2010; Horsthemke 2008; Little Bear 2000; Martindale 2006), and suggests that seeking harmonization between the supposed binaries of Western and non-Western knowledge systems both a possible and worthwhile endeavour. Two models in particular, though not specifically pertaining to software development, may suggest successful paths to collaboration: Ian Barbour's (1990) integration model, and Stephen Ellis's (2005) top-down/bottom up approaches.

Barbour (1990) classifies modes of interactions between differing worldview frameworks into four categories: conflict, independence, dialogue, and integration. *Conflict* and *independence* outright reject the notion that two worldviews can exist in the same space, stating that they will either actively oppose each other (conflict) or co-exist with no interactions (independence). In the case of software development, this would preclude any sort of collaboration with outside developers, and many communities lack the resources to design database software completely independently. *Dialogue* does not seek to combine aspects of different worldviews, but does critically examine the differences in order to assess and transform one's own knowledge. This reflexivity may be useful to software developers looking to understand the limitations of their systems, but would not result in programs that are more accessible to non-Western frameworks, as the resulting platform would still exist to support the developer's worldview, not the non-Western foil. It is only within the module of *integration*, which holds the premise that two seemingly disparate worldviews can combine into a more inclusive framework that developers and source communities can begin to explore the opportunities garnered from collaboration.

Ellis (2005:67) proposes two methods of integration when it comes to Western and Indigenous epistemologies. The "top-down" approach relies on Western institutions to create structures that can accommodate Indigenous knowledge, but the knowledge itself is not sought out to inform decisions or policy. The "bottom-up" approach focuses on the Indigenous perspective, creating avenues to transmit knowledge that has direct bearing on policies. On a macro level, it is difficult to expect the software industry to use the bottom-up approach in creating accessible programs for diverse worldviews; however, it is feasible for programmers working with individual communities to create applications tailored to that community's needs. This is not to say that the top-down approach has no merit. If larger companies create software that allows for users to input their own criteria themselves, then this in itself allows for self-determination even if the individual community was not the target user group.

Whether following one of these models or not, integrating epistemologies into a shared space requires collaborative input. The Inuvialuit of the western Canadian Arctic have historically been excluded from contributing to scholarship on their culture and history (Lyons 2013:17). In 2012, members of the Inuvialuit people traveled to the

Smithsonian to work with an ethnographic collection of over 300 cultural objects obtained by Hudson Bay trader Roderick MacFarlane (Hennessy et al. 2012). The purpose of the visit was to give the Inuvialuit delegation an opportunity to view the collection firsthand, learning about the objects as a museum collection, and contributing their own cultural knowledge and experience with these sorts of objects in turn (Hennessy et al. 2013:50).

The ultimate goal of the collaboration was not the physical repatriation of any of the Inuvialuit objects, but of the knowledge and meaning they carry. This was in part due to the nature of MacFarlane's acquisition of the objects, which modern-day Inuvialuit concluded were purchased fairly. In many cases the items were crafted specifically for purchase by the Hudson Bay traders (Hennessy et al. 2012). Instead of transferring the objects themselves to the Inuvialuit, the Smithsonian worked with the visiting members to develop a website⁷ that would grant the Inuvialuit interaction from afar. This project enabled the Inuvialuit to exercise control over the knowledge encoded in the collection in this digital format, both for the acknowledgement of intellectual property rights, and to pass this knowledge down to younger generations. Thus the website was concerned with the preservation of intangible heritage and its role in Inuvialuit culture more so than the collection itself.

The creation of the website itself became an opportunity to re-contextualize the collection and the cultural information generated from the Smithsonian visit by adding Inuvialuit knowledge and interpretations. Much of the collection had never been publicly displayed, and its identifying catalogue was in many places out-dated (identifying Inuvialuit societies as "Esquimaux") or unhelpful (vague provenance) (Hennessy et al. 2012, 2013). While MacFarlane's original inventory list may have included descriptors provided by the Inuvialuit crafters, this list was never located, and the project members instead worked off a sparse ledger and labels that were transcribed from this list (Hennessy et al. 2013:55).

⁷ <http://www.inuvialuitlivinghistory.ca>

While the museum was a contributing partner to the project, the Inuvialuit Living History website took what, under Ellis’s scheme, is a bottom-up approach in its design, drawing its cues directly from the community. Central to this was the development of the site’s collection exploration mode, tagging objects with different descriptors including item type, material, manufacturing techniques, and keywords using the Siglitun dialect (Hennessy et al. 2013:58). Both Inuvialuit and non-Inuvialuit researchers developed these keywords, and users with editing permissions can contribute their own tags. The individual displays for each item type (Figure 1) also include a “community interpretation” field where users may submit their own knowledge to further describe the item.

SIGLITUN TERMS

Ulimaun

DESCRIPTION

The short-handled adze was used for shaping large pieces of wood. The blades of traditional Inuvialuit adzes were made made from stone. When metal axe and hatchet blades became available through trade Inuvialuit used them to make adzes by hafting the blades sideways onto wood handles. The blade was bound to the handle using a thick hide thong that was put on when wet, and which shrank and became hard and tight when dry.

COMMUNITY INTERPRETATIONS

Darrel Nasogaluak: You can tell if an adze was used by a right-handed or a left-handed person. If you place an adze on its head, with the sharp edge pointed toward you, the handle tilts to the right if it was made for a right-handed person and to the left if it was used by a lefty. The more a head was offset, the bigger the person who used it.



Figure 1: Inuvialuit Living History screencap.
© 2012 Inuvialuit Cultural Resource Centre.

By working with the source community to create categories that complemented the Inuvialuit knowledge schema, the website as a whole promoted accessibility to its Inuvialuit users. At the same time, the staff at the Smithsonian enhanced their own understanding of the material culture through the emic perspective of the Inuvialuit (Lyons 2013:130–131; Reed 2016:310). Thus the MacFarlane Collection’s cultural value increased through this participatory knowledge contribution, and the resulting online exhibit promotes this understanding to Inuvialuit and non-Inuvialuit alike.

Inherent Tensions

The Inuvialuit Living History site is one example of how multiple stakeholders can negotiate to have their perspectives incorporated in a joint project, and the examples that follow in this chapter will demonstrate other ways that this collaboration can manifest. However, this process is not a straightforward endeavour, and requires much work for all participants. While Barbour and Ellis's work demonstrate several schools of thought towards the coexistence of worldviews, there are practical issues in applying models of integration towards software and information technology. Central to this is the conflict between *standardization*, which is a key to long-term digital preservation in which one method of arranging data is replicated consistently by different users (Jeffrey 2012), and *individual community schemas*. Database software relies on metadata cores⁸ to ensure a uniform and predictable mode of retrieval for both users and automated system functions. Even within "Western" digital spaces, conflict exists between the user-generated classifications (such as "tagging" individually selected keywords to files) that remain a tenet of Web 2.0⁹, the so-called "democratization" of the Internet, and industry-derived standards (Dunn 2011:100).

A global classification system derived from information management standards may promote ease of use for the majority of users, but the imposition of an external categorization presents an inaccurate worldview of the source community (Glass 2015:21; Stoler 2002). From the user experience side, these fixed schemes, when encountered by users outside the intended user base, can be a hindrance to the information retrieval and interaction that many databases claim to promote (Boast and Biehl 2011:141; Srinivasan et al. 2009), and users unversed in the *lingua franca* of a specific database may encounter difficulty navigating its records. Classification serves a utilitarian purpose in that the fluency of standardized schemas allows specific information to be easily located, but in many cases cultural knowledge is traditionally

⁸ Preset information fields, often defined by industry standards, which are directly embedded into a file and can be used by software to describe, classify, and otherwise manage the data.

⁹ A critical distinction, particularly for the purpose of this research, between Web 1.0 and 2.0 is the increased level of interaction between users and information. Users of Web 1.0 were for the most part passive consumers of informational websites, while Web 2.0 offers dynamic ways for users to interact and create their own content.

shared through oral histories and traditional narratives (Lyons 2010; Martindale 2006). Determining the architecture of information is both a way of asserting authorship and ensuring accessibility. Ideally, collaboratively created and utilized programs strike a balance between standards of compatibility, and localized needs (Boast et al. 2007:397).

Recognizing the need for new knowledge management standards developed in consultation with stakeholders, Cambridge University's Museum of Archaeology and Anthropology worked with the A:shiwi A:wan Museum and Heritage Center of Zuni Pueblo to illustrate some of the differences in classification schemas between museum standards and the source community. This work considered the role of the object in both museum and source community contexts as vessels of embedded knowledge (Srinivasan et al. 2010:737). Using a collection acquired through archaeological work at a Zuni site, researchers from the A:shiwi A:wan Museum and Heritage Center asked more than one hundred Zuni participants to describe a set of Zuni cultural objects, and compared the results to the responses of museum staff.

Two major differences distinguished the input from museum staff from that of the Zuni cultural experts (Srinivasan et al. 2010:754). First, while the descriptions from museum workers reflected museum catalogue conventions, the Zuni participants tended to describe the objects through a narrative style, using stories from their communities and their personal experience. Storytelling is an important tradition in Zuni culture, and the existing museum catalogue system did not accommodate this mode of information relay. Second, the Zuni participants included the objects' intended usage, while museum staff focused on static, observed physical characteristics. For example, A curator would describe a basket by its size, material, and condition, whereas a Zuni member might recall a personal experience involving basketry, such as observing family using the same sort of basket to process wheat. Descriptions of the objects from a museum perspective are fixed and in discrete categories; in the descriptions given by Zuni participants, they form a living biography of each object and its interactions with people.

Traditional museums with traditional catalogues generally do not offer the connectedness and flexibility to accommodate the Zuni source community's methods of describing objects, as they rely on fixed, static categories to manage collections. Srinivasan et al. urge institutions to look towards digital objects and digital catalogues as

the medium of choice to accommodate the diverse communities they now purport to include. A separate study by the same researchers demonstrated the effectiveness of crowd-sourced cataloguing from the source community via an interactive virtual exhibit, which created new ways of linking and accessing the collection (Srinivasan et al. 2009). Users were invited to explore a digital museum catalogue of cultural objects and contribute their own descriptive keywords for classification purposes, and leave comments on the records pages to express thoughts on how useful they found the existing museums classifications. Digital spaces, when utilized in this way, can simultaneously handle differently formed data sets, and shape the results to benefit both museum staff and source communities.

The lessons from the digital re-contextualization of the Zuni collections culminated in the creation of the *Amidolanne* database. This catalogue, when it is implemented into the A:shiwi A:wan Museum and Heritage Center, will allow Zuni members to view aggregated data on Zuni collections from multiple institutions worldwide, and to contribute their own knowledge and narratives (American Museum of Natural History 2011). Additionally, Zuni members will have the choice to contribute via text entries or audio/video recordings (Mathé 2014:10), populating the database with more dynamic multimedia than the original museum catalogues allowed. By giving Zuni members access to the museum descriptions of cultural items and the opportunity to add their own perspective, the resulting database will merge the standardized museum classification systems with Zuni knowledge, allowing for more flexible descriptions and data formats.

Knowledge Production and Colonialism

Ideas and knowledge spread across different communities through cross-cultural contact. Some forms of knowledge, particularly concerning a society's cultural practices, traditions, and identity, may be more closely guarded within its originating community, and shared under controlled circumstances. Ideally, these source communities should have control over the ways in which their curated cultural knowledge is introduced into public spheres, and thus be able to dictate its access and use. However, the hegemony of Western epistemologies had affected or outright rejected Indigenous knowledge

frameworks long before the Digital Age. Archaeologists, museum curators, and archivists have in practice designated themselves “heritage experts” with the background and privilege to dictate the “best” practices for safeguarding the past (Hollowell and Nicholas 2009:142). This dynamic has led to an “authorized heritage discourse which is reliant on the power/ knowledge claims of technical and aesthetic experts, and institutionalized in state cultural agencies and amenity societies” (Smith 2006:11). These experts determine not only how heritage is managed, but define what constitutes heritage itself.

The imposition of Western archival methods of data organization in the nineteenth-century amounted to “intricate technologies of rule” (Stoler 2002:87), when applied to non-Western knowledge, which was first seized by Western archives for academic interest, and then dissected according to Western epistemology. Designed for archivists and researchers, the ways in which archives catalogue information have historically neglected source community epistemologies. The imposition of discrete classification schemas for the sake of easy cataloguing is in direct contrast to the more holistic, interconnected nature of many Indigenous worldviews (Cherry and Mukunda 2015:550; Duarte and Belarde-Lewis 2015:693). Catalogues have also failed to acknowledge the contributions of source communities in the creation of archival materials. Typically, the documenter of such material is credited as “author,” with the individuals who contributed through word or action only recognized as “subjects,” lacking agency over their own representation (Hennessy 2012:356; Anderson 2013:232). While postcolonial anthropology seeks to eliminate the troubling power imbalance between researcher and subject, information sciences may still perpetuate this dynamic by developing schemas to benefit a predominantly Western user base.

In recent years, informational institutions such as museums, libraries, and archives (MLAs) have revised mission statements to accommodate open public access (Krpmotich and Peers 2013:36). However, “suitable for the general public” is perhaps more accurately described as “suitable for the dominant demographic.” Thus, the degree to which MLAs have allegedly opened their doors requires critical assessment. Many museums in North America have built their collections from the belongings of Indigenous communities, and despite the increase in collaboration and repatriation efforts, this still holds true today. The very Western approach to grouping information for ease of

Western use is in many cases applied to information and objects of non-Western origin (Cherry and Mukunda 2015; Duarte and Belarde-Lewis 2015; Lee 2011; Stoler 2002). If MLAs are earnest in their efforts to increase accessibility and approachability, these must include (and even begin with) input from the cultures from which these collections derive.

In considering the potential for collaboration between museums and descendant communities, Robin Boast (2011:65) provides words of caution against an “overly optimistic view of cross-cultural dialogues.” Even with the best intentions, museums are still institutional repositories dedicated to public education and research. Collaborative efforts with source communities may result in a better representation of that community’s worldview, but this is still conducted to the museum’s overall benefit. This “neo-colonial collaboration” still overwhelmingly benefits the museum and its operations, using indigenous knowledge to enhance how collections are managed. One way to work against this, Boast suggests, is to develop and maintain long-term relationships between community and institution, creating a dynamic of reciprocity and mutual goal seeking, rather than treating communities as expert, but temporary, consultants.

The Pitt Rivers Museum at the University of Oxford houses over 300 Haida items from the eighteenth and nineteenth centuries. Acquired during the ages of antiquarianism and cultural evolutionism, these objects were initially viewed as specimens of a Stone Age civilization, and classified as such in the museum’s collections (Krpmotich and Peers 2013:9). The Haida people, separated from the collection by both physical distance and Western ambivalence, had no say in the treatment and labeling of these objects.

The mid-to-late twentieth century saw the beginnings of more cooperative efforts with Haida scholars and artists, such as Bill Reid and Dolores Churchill, who sought to engage with museum collections as a way of revitalizing traditional Haida culture and art. In the 1970s, museums including the Pitt Rivers reciprocated these efforts by inviting Haida delegates to view these collections, and lend them out in the short-term (Krpmotich and Peers 2013:14–15). However, these collaborations did not result in permanent repatriation of Haida material culture, nor did the museum’s information

infrastructure see fundamental shifts to better reflect the Haida delegation's perspectives.

In 2009, a group of Haida representatives travelled to the Pitt Rivers Museum to take part in a multi-day workshop viewing and discussing the collection alongside the museum staff. This initiative reflected an international trend to improve accessibility and appeal to visitors beyond the Western, wealthy demographics museums traditionally work to attract (Krmptich and Peers 2013:36). By opening the Pitt Rivers collection to the source community, both the museum staff and visiting Haida delegates hoped to re-contextualize the objects through collaborative study and discussion, while working towards longer-term goals of repatriation (Krmptich and Peers 2013:17–18).

Much of the project dealt with removing the traditional barriers museums imposed on their collections, so that the Haida delegation would have unprecedented access to the objects. The participants also questioned the ways that the museum had structured information around the collection. The perspective of the nineteenth century museum staff had shaped the original museum descriptions, and the nature of their acquisition from the Haida. However, as one Haida representative noted, “people did sell things, absolutely, but it was under duress” (Butler 2010). When cast in Victorian-era terms, the museum's acquisition of the collection was conducted in a fair, appropriate, and legal manner, but without the context provided by the other side of those transactions, this version of history obscures the feelings of loss and need for repatriation experienced by modern-day Haida. The museum staff apparently also recognized the out-dated nature of the original cataloguing system over a decade before this project. In 1995, the gift shop carried a postcard that displayed handwritten object labels from the twentieth century, framing this classification scheme as a piece of history along with the items they described (Pearce 1999). While catalogues on the surface seem like straightforward datasets of attributes, they in fact actively shape the history and perceptions of cultural material.

The classification system within the museum catalogue also proved problematic, with objects routinely misattributed to the wrong cultural group, and Haida terms misspelled, or mistranslated through a colonial perspective (e.g., items used in spiritual practices labeled as “grotesque” due to condemnations of non-Christian religious

practices) (Krpmotich and Peers 2013:75). In reviewing these records, it became clear to the museum staff and Haida delegation that the collaborative efforts needed to extend beyond the physical treatment of the collection. The museum catalogue itself bore the marks of the fraught relationship between the Haida and early British settlers, and would require reinventing the catalogue structure of the museum itself.

One way in which the team worked to redevelop the catalogue was by considering how to accommodate Haida interpretations through a modified format and classification system. Museum staff favoured terms that could be broadly applied across the entire museum's holdings, while the Haida delegation advocated for terms particular to traditional use and function – for example, tagging a serving vessel as a “food” vs. a “feasting” object (Krpmotich and Peers 2013:148). By working with the Haida to change the ways in which these objects were labelled, the community could reframe the collection not as objects of study, but the sources of social identity and belonging they were created to be (Krpmotich 2010:169). This resulted in an increased understanding of the physical objects, and a new perspective on the information curated around the collection, and a better framework for incorporating context and knowledge from the source community. Perhaps more significantly, by breaking from the standard museum schema of describing objects, this project reframed repatriation efforts (which resulted in the return of ancestral human remains in 2010) not as an institutional transfer, but an enactment of Haida self-determination and kinship obligations to their loved ones.

Indigenous on the Internet

Digital data management offers users fast and flexible ways to handle large datasets and accommodate an ever-shifting data environment. When migrated to an online platform, this potential extends to the sharing of such information across the world. The current trends in online spaces focus on the global, participatory culture dubbed “Web 2.0.” The defining characteristics of Web 2.0 are user experience and user-generated content, observable through the popularity of social media platforms such as Facebook and Twitter, and folksonomic knowledge repositories like Wikipedia. With access to the Internet continuing to spread globally, information exchange has never been faster or easier. While the reuse and remixing of data are core components

of the Web 2.0 experience (open-source coding, described in Chapter 3, is one example of this aspect), attempts to limit user access and rights have been heavily contested.

Net neutrality supporters believe that online information should be treated equally in terms of access and have vehemently criticized proposed legislation that would allow providers to change Internet speed for users based on services accessed as an infringement on free speech. These proponents argue that impeding the ease of access to less wealthy user groups would impede their ability to contribute to the online experience as fully as those able to pay more for a more robust service (Hattem 2014). Efforts by companies to control the use and distribution of data, such as by preventing users from making copies of legally obtained media, have also been met with resistance (Christen 2012:2872). The tensions between intellectual property rights and the desire to promote free and open access to information have spurred Internet-specific legislation internationally (Haggart 2014; Litman 2001; Quist 2010). At the same time, such non-commercial licenses as Creative Commons offer modes of attribution and fair use for contributors who wish to distribute their works online in a controlled manner, making up for legislatures' slow response to the impact of technology on the concept of intellectual property (Jones 2009:116). While debate continues across discussion forums and in legislative assemblies, rights over access and ownership from a non-Western framework are often overlooked or dismissed.

Copyrights and intellectual property ownership have historically been points of contention among many Indigenous communities, in part because the Western framework of individual and discrete ownership over ideas has in many cases been a poor fit with Indigenous concepts of knowledge stewardship. While intellectual property laws may emphasize the rights of ownership, Indigenous communities may define their own rights in terms of social obligation (Krpmotich 2010:159–160) or guardianship (Lai 2014:62). On top of this, repatriation efforts by communities to reclaim archival media of their relatives and ancestors have all too frequently been turned down, as legal ownership typically belongs to the documenter (Anderson and Christen 2013a:106). With the failure of law and conduct to protect Indigenous intellectual property rights, a more promising solution may be found outside the operating legal systems.

One initiative to rectify the lack of clear guidelines on the use traditional knowledge in online spaces, based on the concept of the Creative Commons licenses, is the Traditional Knowledge Labels project. It emerged out of the development of the Mukurtu CMS platform (described in detail in Chapter 3), as a way to offer communities options for enacting protocol digitally without requiring the use of the software. Spearheaded by the director of Mukurtu Kim Christen, and its legal consultant Jane Anderson, the aims of the project are two-fold: 1) to recognize the ownership and agency that Indigenous communities have long been denied over their own intellectual property and 2) to promote global awareness towards the proper treatment of sensitive cultural knowledge (Anderson 2012:69). TK Labels serve as educational tools to provide information to Web users on the original and ongoing cultural contexts of objects and information (see Table 1). The labels also inform visitors of the correct protocols for these objects' use and distribution (Anderson and Christen 2013b).

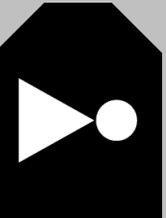
TK Labels exist in part due to the failure of the legal system to address non-Western needs to assert control over their own intellectual property. Importantly, it adds the component of recognizing *community* ownership and moral rights, as opposed to the legal and often individually based rights granted through copyright laws. The labels describe the traditional protocols governing its use within the community and the stipulations of its use and circulation for the general public. This allows communities that wish to share cultural knowledge online, or to work with institutions that hold digital media with embedded cultural knowledge, to inform users of the cultural ramifications of misuse rather than legal penalties. Some of these protocols share terms found in the Creative Commons licenses (e.g., “non-commercial,” “attribution”), while others are unique to traditional knowledge (e.g., “women restricted,” “sacred”). Additionally, the TK Label template provided via the Local Contexts website¹⁰ allows communities to customize their label library to fit specific protocols. While these labels are informative, not legally binding, they offer Indigenous communities ways to express their knowledge sharing protocols through a standardized format using a lexicon recognizable to the average Internet user.

¹⁰ <http://localcontexts.org>

By attaching contextual information to cultural knowledge, communities that do wish to partake in online forms of communication may do so in a more measured way than simply choosing which items can and cannot be shared online. Fair use, which allows use of the licensed material without explicit permission with the understanding that it is used in accordance with the license holder's stipulations, is at the heart of the project. In addition to providing cultural context, the labels clearly place a set of expectations on the visitor, while stating the source community's intention in sharing them (Anderson and Christen 2013b). One recent example is the Sq'ewlets website project¹¹, which uses TK Labels to attach Sq'ewlets and Stó:lō sharing protocols to the publically accessible Virtual Museum of Canada exhibit. The success of TK Licenses and Labels to protect Indigenous heritage online will rest both on the willingness of communities to use them, and the degree to which their mandates are followed by the larger online community.

¹¹ <http://www.digitalsqewlets.ca>

Table 1 : Examples of TK Labels (Anderson and Christen 2017).

Label Name	Icon	Description
TK Family		<p>This label is being used to indicate that this material is traditionally and usually not publicly available. The label is correcting a misunderstanding about the circulation options for this material and letting any users know that this material has specific conditions for sharing between family members. Who these family members are, and how sharing occurs will be defined in each locale. This material is not, and never was, free, public and available for everyone at anytime.</p>
TK Outreach		<p>This label is being used to indicate that this material is traditionally and usually not publicly available. The label is correcting a misunderstanding about the circulation options for this material and letting any users know that this material can be used for educational outreach activities. This label asks you to respect the designated circulation conditions for this material and additionally, where possible, to develop a means for fair and equitable reciprocal exchange for the use of this material with the relevant TK holders.</p>
TK Women General		<p>This material has specific gender restrictions on access. It is usually only to be accessed and used by women in the community. If you are not from the community and you have accessed this material, you are requested not to download, copy, remix or otherwise circulate this material to others without permission. This label asks you to think about whether you should be using this material and to respect different cultural values and expectations about circulation and use.</p>
TK Non-Commercial		<p>This material has been designated as being available for non-commercial use. You are allowed to use this material for non-commercial purposes including for research, study or public presentation and/or online in blogs or non-commercial websites. This label asks you to think and act with fairness and responsibility towards this material and the original custodians.</p>

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Digital Contact Zones

TK Labels provide communities with tools to participate in the online world while safeguarding traditional knowledge, but the fact that such tools are required indicates systemic challenges in the public sphere of the Internet. Despite, or perhaps because of the global connectivity that online platforms provide, cultural differences can still cause friction through cross-cultural interactions. Much of the software marketed globally comes from developer enclaves such as Silicon Valley, which critics point out lack diverse representation (Jacobsen 2014; Pepitone 2013). When a small subset creates products for users on a global scale, it is inevitable that minority preferences will be overlooked in favour of more visible demographics, particularly if they have no representation within the development community. When Apple introduced its Health Kit application in 2014, it was criticized for lacking options for women's health; a diversity report released the same year showed the company to be staffed largely by male employees (Duhaime-Ross 2014; Lowensohn 2014).

When considering the tension between Western and non-Western frameworks online, it is important to remember that Indigenous communities are particularly disenfranchised (Logan 2004). Disadvantages in access to education, funding, and reliable power and communication services have affected the levels to which Indigenous communities can represent themselves (Salazar 2007:17). However, information *about* Indigenous communities is easy to access and disseminate through the lenses of predominantly non-Indigenous users. When Indigenous representation is projected through the perspective of a dominant culture, that culture's own interpretation and biases embed in that information as it continues to circulate (Iseke-Barnes and Danard 2007:29). Without the input of the source community, this can reinforce or perpetuate a misunderstanding of that information's cultural context and appropriate usage. One such case resulted in legal action when Lego launched their Bionicles line – inspired by Maori cosmology, but lacking any consent from the Maori people to turn their belief system into flavour for a revenue-generating line of toys (Coombe and Herman 2004). However, as in the previous section, cultural heritage is often not covered by intellectual property laws, limiting the types of recourse communities have when misuse occurs.

Online platforms offer new opportunities for positive contact and collaboration (Kelty et al. 2008), and it is to everyone's benefit to seek appropriate ways to reach different demographics. Truly representative knowledge management requires not only input from source communities, but also the autonomy to implement their own schema. A platform that allows communities to determine firsthand the protocols surrounding knowledge and the mode of its delivery can help to reinforce cultural identity and rights for internal operations through interactions with outside governments, institutions, and the general public (Christen 2009; Molyneaux et al. 2014; Shepard 2015).

Language is one way in which communities can assert cultural values in multicultural spaces, as traditional knowledge and worldviews can often be embedded in the unique vocabulary and sentence structures. For many Indigenous communities, language loss is a powerful reminder of the lasting effects of colonialism the imposition of settler culture. Revitalization efforts in turn can help to strengthen group identity (Baloy 2011:517). Projects to pass on traditional language, culture, and knowledge often employ digital methods of communication and education. Many digital platforms do not support the orthographic spellings of Indigenous languages that best represent unique sounds and structures, forcing communities to use inaccurate spelling. This can make searching for information within the language difficult, as well as not properly representing the proper language and its pronunciation.

The FirstVoices project¹² supports Indigenous communities in Canada in the endeavour to preserve, convey, and teach their languages in online spaces. It originated from a language revitalization project in the 1990s, when Saanich teachers John Elliot and Peter Brand developed a software tool that allowed the orthographic Saanich language to be typed on a keyboard (Godfrey 2008:20). The developers would later partner with the First People's Heritage, Language, and Cultural Council to bring the tool online, and also worked with additional Nations to integrate their own languages. The software suite includes language archives, language teaching software, and mobile keyboard apps that support over one hundred Indigenous languages (First Peoples Cultural Foundation 2013) (see Figure 2). The online repository contains dozens of

¹² <http://www.firstvoices.com>

language archives, some of which are publically accessibly, with others limited to community access via password protection. Communities that use the FirstVoices software tools can create education modules in the form of online lessons, teacher resources, and games as ways of teaching the language within and outside the community (Godfrey 2008:21).

Dane Zaa Keyboard Layout

~`	1	2	3	4	5	6	7	8	9	0	=	+	←
↵	q	w	e ə	r	t ts	y y	u u	i	o	p	^	˘	?
Caps Lock	a æ	s s	d dz	f	g	h	j	k	l	ł	"	↵	
↑	z	x	c	v	b	n	m	;	:	?	↵		
Control	Option	Alt									Right Alt	Option	Control

Figure 2: Installable Dane-zaa keyboard available via the FirstVoices website.

The ability for a community to withstand and respond to cultural misappropriation and erosion depends on access to social capital and the ability to network (Molyneaux et al. 2014:277), which is shifting towards digital and mobile platforms. As web access becomes increasingly available globally, and more people choose to communicate through online platforms, the ability to present and communicate using Indigenous languages may help communities keep their language alive and present in the modern world, particularly among younger generations who use texting and social media prodigiously. Introducing Indigenous language into modern forms of communication counters the notion of languages as obsolete or extinct. The use of mobile apps as a way to localize global social media enables the readily available, often free platforms to serve as a way of connecting communities without strictly adhering to the framework set up by Western developers.

New Heritage, Same Issues

Digital information offers exciting opportunities on both global and local levels. Open access journals and repositories are of particular interest to researchers who have

in the past had difficulty accessing information cheaply, or at all. Integrated multimedia is commonplace as well, so that information can now be experienced in visual, audio, and interactive formats. For concepts as complex as “heritage,” this provides many possibilities for those looking to both express and experience cultural knowledge, by offering new methods of interaction with digital facsimiles of cultural expression.

Digital surrogates of cultural objects offer source communities, academics, and the general public opportunities to view and interact with objects they may have never seen otherwise, due to physical distance, the practicality of access, or the object’s destruction. New 3D technologies offer even more options for interactivity. For example, the British Museum has created downloadable 3D models of over 150 of their artifacts for the general public to print at home (Vincent 2014), allowing individuals to interact with physical replicas of the ancient past. Likewise, after the reported destruction of Palmyra, a group of heritage specialists recreated the site’s iconic buildings within the video game *Minecraft* (VALUE 2015), creating a version of the site that can be experienced in a virtual space even if the original has been permanently altered or destroyed. These examples, along with similar endeavours, are intended to increase and enhance the public’s access to heritage objects.

The concept of digital heritage is a relatively new one, and one that both Western and non-Western peoples are continuing to develop and understand (Carlton 2010; Coombe and Herman 2004; Newell 2012; Were 2015). Both as surrogates for tangible heritage (e.g., photographs and 3-D models of objects) and multimedia representations of intangible heritage (e.g., audio/visual recordings of traditional performance), digital heritage faces issues in its conservation and application. Much as with other contact zones (e.g., museums, libraries, and archives), tensions can form between the expectation of public access, and source community agency over the control and protection of sensitive information.

UNESCO’s Charter on the Preservation of Digital Heritage (2003a) states that “access to digital heritage materials, especially in the public domain, should be free of unreasonable restrictions. At the same time, sensitive and personal information should be protected from any form of intrusion.” However, these statements highlight contradictory ideas around “appropriate” use and access to knowledge. The Charter

does not offer guidance on how to determine “unreasonable” restrictions from “protection from intrusion”, leaving it to be decided on a case-by-case basis. Like the shortcomings in legal systems that inspired the development of TK Labels and Licenses, this phrasing leaves no middle ground between open, public heritage, and private ownership. Once more, this subjectivity is left in the hands of whoever controls the cultural heritage, linking this issue back to the debates over information ownership and access.

Websites, social media, and other forms of online dissemination allow groups who have previously been kept from global communication due to remote location to more assertively present themselves and their heritage to the world. This practice can be internally regulated to a more local or selected user base level through the use of password-based access, or local area connections. Such a network may be of particular interest to communities with endangered language or culture, or who have diasporic members, as a way of passing on aspects of heritage to younger generations and reinforcing community bonds.

Many Australian Aboriginal communities have knowledge protocols that predate the culture of open access by millennia (Morphy 2015:91). These protocols take the form of a hierarchical structure of privilege, with elders held in the highest position. Certain roles may fall along the gender divide as well. Though many of these rules had been in practice in pre-contact societies, the partnerships forming between more formalized Western institutions and Aboriginal communities through reconciliation efforts necessitated documentation of these cultural protocols, particularly concerning the sharing of information (Morphy 2015:92).

Museum repatriation projects in Australia have required express rulings over the exchange of information and objects back to their source communities. Digital returns¹³, in which original or “master” files are transferred to the community’s control, are cheaper and simpler to facilitate than the return of physical objects, though the format of the return and its distribution to the source communities bring their own challenges,

¹³ Whether or not the relinquishing of digital materials to a source community constitutes repatriation is still a matter of much debate (Boast and Enoto 2013; Carlton 2010; Dawson et al. 2011; Kramer 2004; Resta et al. 2002). To differentiate between the giving over of digital surrogates vs. the original, tangible objects, I opt to use digital “return” rather than “repatriation.”

especially when incorporating protocols. Anangu elders Peter Nyangu and Colin Tjapiya, in consultation with anthropologist Ushma Scales and archivist John Dallwitz set up the Ara Irititja database in 1994 as a repository for the Anangu (Ngaanyatjarra, Pitjantjatjara and Yankunytjatjara) peoples of central Australia for digitally returned photography, audio recordings, movies, and other documentation of Anangu heritage. The use of a digital platform for these returns promoted a more equitable level of access for the remotely located communities (Christen 2006:57). The project focused on both aspects of access: making the material available and within the control of the Anangu communities, and establishing safeguards to ensure that sensitive or private material is more restricted within the digital platform.

The resulting database, operated by the Pitjantjatjara Council's Social History Unit at the request and with continuing feedback from the Anangu peoples, has access levels encoded into each object, so that communities have granular control over what information is available to whom. Individual items are embedded with metadata that allows the source communities to designate its openness within the community. Of particular note is the database's "sorrow" tag, which enables a community to mask images of recently deceased individuals, rather than having to remove such items from the collection entirely (Christen 2006:57–58; Hughes and Dallwitz 2007:152). This allows Anangu communities to retain traditional knowledge sharing protocols, including situational and malleable access, promoting knowledge about heritage without compromising sensitive information.

The Anangu, more so than other Australian cultural groups, have strict rules involving gender (Morphy 2015:98). Items that are considered men's or women's "business" cannot occupy the same physical space, and these rules apply to the digital surrogates and their related information as well (Hughes and Dallwitz 2007:152–153). It was not enough to merely hide items from users if their community standing did not permit them access. Instead, the solution was to create restricted databases separate from each other, and to install them on separate *niri-niri* (the metal terminals installed in Anangu communities for local access to the database – lit. translates to "scarab" due to the shell-like appearance of the computer).

Initially, the Anangu communities did not want any archival material to be placed on the Internet (Hughes and Dallwitz 2007:155). For many Aboriginal communities, a breach in data security would have far greater consequences than the financial and legal concerns held by many institutions with online presence. Restricted access material that is inappropriately exposed carries a risk of both spiritual injury and physical punishment to the perpetrator, and early Anangu exposure to the Internet left many community members sceptical of the ability to safeguard their most private information (Hughes and Dallwitz 2007:153–155). More recently, and with much community planning, the project has migrated to a browser-based as a knowledge management system, using password protection to safeguard more sensitive information (Ara Irititja Project 2013) (see Figure 3). While the archive remains viewable only to the Anangu communities, this increased accessed has inspired some members to create multimedia exhibits and publications to share this knowledge publically, in a more curated manner.



Figure 3: Ara Irititja database cultural warning.
© 2011 Ara Irititja Project.

Digital Institutions and Opportunities

The process of digitizing collections held within museums, libraries, and archives has typically been carried out by those institutions whether or not source communities are involved (Srinivasan et al. 2009). With collections already catalogued in analogue forms, it is often easier to work with the existing dataset in a new format rather than start anew, and these digital platforms tend to inherit the existing conventions of institutional management (Boast and Biehl 2011:144). However, the shift in technologies to an open, user friendly experience has created opportunities for MLAs to share information through more interactive modes (Cameron and Kenderdine 2007; Krmpotich and Peers

2013:38). Berkeley archaeologists recreated the Neolithic site of Çatalhöyük in the online game Second Life, allowing visitors from around the world to experience digital versions of the area both in its modern form as an site of archaeological investigation, and how it might have appeared 10,000 years ago (Tringham and Wittman 2009). The non-profit organization CyArk uses laser-scanning technology to produce 3-D models of heritage sites which can be accessed and viewed through their website¹⁴. As curators, archivists, archaeologists, and other heritage specialists look to reach viewers in new ways, they should also seize this opportunity to design these updated frameworks to include the cultural contexts of their collections, and the priorities held by source communities.

Glass (2015:36) describes three challenges of bringing Indigenous epistemologies into computer-based formats on three levels. First, does computer syntax in its current form and at its most basic level have the capability to support non-Western frameworks? If a programming language is limited in its ability to express Indigenous knowledge frameworks, then any software built from it will be similarly inadequate. Second, once the software is created, are database managers able to develop and incorporate suitable categories? As a relatively new medium, digital heritage presents challenges in its classification and representation. On top of this, source communities must be able to provide input into any resulting format. Finally, has the user experience design on this program included usability for non-Western users? Though members of younger generations are often at ease navigating digital realms, this is not universally true; additionally, many knowledge holders within Indigenous communities may have more difficulty learning new systems, and have more success if the software is designed with their use in mind. This may include using a less text-reliant interface, or including tags in the community's native language.

Glass's aim in outlining these three levels of consideration is not to make the challenge of creating such software seem insurmountable, but to explain what is required in the development process. To return to Ellis's (2005) models of integration, Glass approaches the issue of digitized Indigenous knowledge systems from the bottom-

¹⁴ <http://cyark.org>

up model, designing software against a checklist of compatibility. The standardizations of institutional frameworks have so little allowance for Indigenous knowledge systems (Boast et al. 2007; Srinivasan et al. 2010) that there is no option but to design a database from scratch, which is exactly what Glass did for a collection of Kwakwaka'wakw objects at the Berlin Museum (see below). However, while a custom database may be the ideal solution for incorporating non-Western frameworks, this is not a realistic option for many communities, as this can be an expensive endeavour.

An initiative to re-catalogue the Jacobsen collection of Kwakwaka'wakw objects stored at the Berlin Museum provided an opportunity to incorporate three seemingly disparate classification systems: the nineteenth-century museum, the modern museum, and the Kwakwaka'wakw themselves. While the information recorded by the curators of the 1800s may not have the same importance or the assumption of authoritative knowledge, these records still contain historic relevance. The relationship between the nineteenth century Kwakwaka'wakw and the German ethnographers, who compiled the museum collection, while fraught with colonial power imbalances, is part of the history of both the objects and the Kwakwaka'wakw (Glass 2015:24–32). Incorporating archival notes into the database contributes to the understanding of how these objects came to Berlin initially, and helps explain their historical significance from both sides, while also providing explanations for the state of the museum catalogue as it was originally formed.

Likewise, the input of both modern Kwakwaka'wakw and the curators of the museum today can both shape the usability of the catalogue for their own purposes, as well as add enriching information for other users. Glass (2015:34) created a new catalogue using FileMaker Pro to incorporate all three schema, which allowed the simultaneous recording of museum management data, source community input, and historic cataloguing notes. Thus the original museum catalogue is preserved not as the designated classification system, but as a chapter in the biographies of the objects. The flexibility of a catalogue built from the ground up enabled all three datasets to coexist in a single record, with room to add more information as the catalogue continues to be updated. The migration from card catalogue to FileMaker Pro database also enabled a more active relational network in which objects are linked to each other. This is particularly important in representing Indigenous epistemologies, where the significance

of a heritage item is not in the individual object itself, but in its relationship to other objects, peoples, or places.

This FileMaker Pro database is a first step in a longer-term project to make information about the Jacobsen collection more accessible to the Kwakwaka'wakw community and collaborating researchers. Future plans include a copyrighted website with password protection to control who is permitted to access the material, as well as uploading the collection to the Museum of Anthropology at UBC's Reciprocal Research Network¹⁵, which facilitates interactions with museum collections from members of the source community and encourages collaborative research efforts through accommodating diverse knowledge systems in an accessible interface (Glass 2015:36; Rowley et al. 2010). While the bringing together of disparate cultural and archival information is important to the process of decentralizing the epistemology of the museum, one major concern is that addressing only the topmost layer of knowledge will "simulate shallow features of Indigenous culture while maintaining the fundamental supremacy of standard, Western categories and structures" (Glass 2015:38). In other words, Indigenous knowledge, if kept only as a descriptor rather than shaping the information and its delivery, is still subjugated if kept within a database designed for Western users.

Database and Content Management Systems

Content management systems are a specific type of database software used for the creation and management of content, acting as a type of digital filing cabinet. Unlike standard relational databases that can only store strings of text, a CMS directly handles and modifies files. The content itself is comprised of two elements: the "essence," or file, and that file's metadata, which are stored or embedded with the file. Metadata are used to identify, describe, and classify a file (Mauthe et al. 2004), as well as relate it to other items and functions. Some CMSs are used purely for back-end data administration, such as webpage infrastructure, while others include functions for front-end interaction, as with library catalogue searches. For many digital repositories, CMS platforms are the

¹⁵ <https://www.rrncommunity.org>

first step in digitizing and categorizing content. As the point of ingestion across multiple sectors and industries, it is a suitable focus to examine the issues inherent in digitized knowledge in Indigenous communities.

As the main software type considered in this research, CMS platforms afford particular consideration towards successful Indigenous heritage management. First, most relational databases rely on discrete data entries to represent singular files or information packets. Non-Western worldviews, while as diverse as the people who hold them, often hold common notions of holism and reject notions of firm dichotomies (Little Bear 2000; Hart 2010; Rice et al. 2005). Therefore, the very structure of a database as singular pieces of information may already misrepresent a potential user community's knowledge system. CMSs that offer more functions in the ways of plurality, object fluidity, and multiple ways of relating information may offer more promise.

Whether or not a community equates digital information with heritage is also a point of consideration. Heritage, as stated in Chapter 1, is an ascribed status, and whether the value of a physical object, along with the protocols and protections applied to it, transfers to photographs, replications, audio and visual recordings, and other forms of digital documentation is not a certainty. Research on the authenticity of digital surrogates has been carried out far more thoroughly elsewhere (Boast and Enoté 2013; Carlton 2010; Hennessy 2010; Hogsden and Poulter 2012; Hollinger et al. 2013; Kuprecht 2014), but the relationship between people, heritage, and digital representations has a direct impact on the way that CMSs can be suitably harnessed to serve Indigenous needs.

The Great Lakes Research Alliance for the Study of Aboriginal Arts and Cultures (GRASAC) launched their own custom CMS in 2008 for the purpose of storing heritage knowledge, connecting communities and academics, and creating virtual exhibits. Like the Haida Project, it began with a collections workshop held at the Pitt Rivers Museum (Bohaker et al. 2015:46). GRASAC took the conversation into a digital space via the development of a collaborative digital repository, where communities of the Great Lakes and researchers could continue to contribute their insights to better understand heritage items, and store these discussions as an aspect of heritage as well.

The GRASAC Knowledge System (GKS), currently in its fourth iteration, requires login credentials to access anything other than the publically available, curated website¹⁶. With over 100 members contributing (GRASAC 2014), cultural and academic knowledge form an interdisciplinary, non-hierarchical knowledge database. Institutional partners have contributed their own digital collections, making heritage items more accessible to their source communities. Through this gated network, GRASAC has produced four public pages presenting images and stories of cultural objects and practices, with plans to create more in the future.

Within the database, objects are viewable in single entry records similar to a museum collection database, with physical attributes and provenance described for each item. Ambiguous or contradictory information, which institutions may be inclined to omit to avoid confusion or messiness, has a purpose within the database. Users are encouraged to attribute entries even if they are uncertain of its accuracy, and to include the reasoning behind their contribution (Bohaker et al. 2015:46). At the same time, users are unable to alter existing comments without the permission of the original contributor, differentiating the GKS from crowd-sourced repositories like Wikipedia. This policy allows the existence of multiple interpretations, particularly important when the items themselves are under contested ownership (as multiple communities and kin groups may claim heritage) while maintaining transparency.

The GKS hosts digital surrogates of items sacred to some of their participating communities, such as shell bead wampum (Bohaker et al. 2015:48). Though the database side of the website requires a GRASAC-issued user login, the presence of these sacred objects required GRASAC to consider how to handle access levels within the researcher community. In consultation with their own cultural advisors, participating Great Lakes communities designated which heritage objects were simply too sensitive to be included in the database in any format. Other items were permitted within the database, but are only viewable by specific approved users (Bohaker et al. 2015:54).

¹⁶ <http://grasac.org>

In addition to individual user privileges based on object views, GRASAC created user types with pre-set permissions, based on the different roles fulfilled by contributors to GKS. Full members are able to create and edit records freely, while research assistants may make edits under the supervision of full members (Bohaker et al. 2015:55). View-only memberships are granted to approved “guest” members, and individuals seeking access must go through a GRASAC approvals process before to receive credentials. This vetting process allows much more control over the exchange and management of information, though the process is unlikely to be easily scalable to communities numbering in the thousands.

The GKS as a CMS for the heritage of Indigenous Great Lakes communities is part digital returns platform, part collaborative research space, and part digital museum. By developing it from the ground up with partnering stakeholders, GRASAC put those communities’ goals and concerns at the heart of the software, and the database continues to grow in accordance with those needs. However, as a grant-funded initiative, GRASAC, as well as the Inuvialuit Living History site, FirstVoices, and other examples cited throughout this chapter, has access to resources that most Indigenous communities on their own do not. A custom-built CMS is not a viable option in most cases.

Summary

The effects of colonialism are still felt by Indigenous communities across many aspects of modern life. The efforts of early modern explorers, traders, collectors, and researchers to obtain, document, and describe aspects of Indigenous heritage has established a tradition of managing information for the benefit of a Western audience. However, in recent decades some institutions holding such collections have begun to make restructuring efforts to include the voices of these source communities, who can contribute both knowledge and culturally appropriate methods of sharing aspects of their heritage. Efforts like the Haida Project, the Inuvialuit Living History site, and the custom database for Kwakw̱aḵ’wakw belongings have resulted in museum catalogues more responsive to Haida, Kwakw̱aḵ’wakw, and Inuvialuit knowledge systems, and more accurately represent the collections as these communities see them.

Digital technologies offer ample opportunity to safeguard, share, and interact with heritage information in new and engaging ways. The creation of online tools like the FirstVoices website and the GRASAC, *Ara Irititja*, and *Amidolanne* databases increase access to Indigenous language and heritage for remotely located community members. However, the culture of software development and the Web 2.0 era, coupled with institutional colonialism, requires special consideration for communities wishing to participate in such advances, one that the TK Labels was created to address by providing culturally specific context for information shared online.

Initiatives that successfully accommodate the particular cultural considerations a community holds involve the full partnership of that community, and often a fully customized software solution. Most of the examples presented in this chapter were built to address a specific heritage management need, and were supported by academic resources and expertise. Financial, political, and other social imbalances preclude this option for many communities. Off-the-shelf options are a more realistic choice for communities without such resources, but the question remains whether or not any of these programs can answer some of the challenges faced by Indigenous communities working in digital spaces. In the next section, I review the CMS software marketplace and identify what off-the-shelf options are available to prospective users seeking a management system for heritage information. I consider a number of features pertaining to different aspects of the software use experience, including acquisition, setup, and platform capabilities to assess how these factors may impact Indigenous users. Using this analysis, I discuss whether or not any of these programs address some of the challenges faced by Indigenous communities looking to bring their heritage into digital formats.

Chapter 3.

Software Evaluation

Communities with cultural protocols for managing, displaying, or accessing certain types of information in a specific manner may not find adequate solutions in an off-the-shelf software package, even when so many options exist. In the Chapter 2, I described a number of customized solutions to handle Indigenous heritage in digital formats, but these exemplars are not feasible for communities lacking the resources to implement such specialized software. There are hundreds of content management programs and services, which vary in structure, features, and user accessibility. Some are marketed for specific industry usage, while others, such as Microsoft Sharepoint, are designed to work for many types of operations (Maas and Kowatsch 2012:5). These factors all play a role in how suitable a particular software package is for use for a particular organization. When considering the potential challenges of integrating Indigenous traditional knowledge frameworks with predominantly Western-derived platforms, there is the additional layer of cultural suitability to consider. On top of whether a particular platform is affordable, functional, and works within the organization's structure, Indigenous communities looking for a heritage management solution must also consider if cultural knowledge will be handled appropriately within the system.

In this chapter, I survey six CMS platforms and compare features as they pertain to the issues of digital heritage management outlined in Chapter 2. In addition to developing a picture of the current software options available, this assessment will frame the interviews that form the bulk of this research by providing an understanding of the current options available, and how participants may have been influenced in their software selections. I have included it in this thesis before both the methodology and results of the interviews as the process generated hypotheses about software selection and use for Indigenous heritage management, which helped in the design of the

interview process. I begin by defining both the factors to compare between the platforms, and the platforms under consideration. These are intended as illustrative examples, rather than an exhaustive list of all key features and options in considering Indigenous heritage management. I then analyze these features across the six platforms, assessing how these features in combination may make them more or less responsive to Indigenous heritage requirements. I conclude the chapter with recommendations for selection strategy both generally and in reference to the six platforms analyzed.

Features

I selected seven different features to analyze across platforms, chosen for their potential influence in selection making for heritage management. These include target user type, license, cost, operating system, hosting options, multimedia capability, and level of customizability. Where possible, I have used information made available by the software vendor/developer to identify key features to use in my analysis. This information is not always publically available, as several developers encourage prospective buyers to contact them to build a software package based on individual needs. Sources other than the developer website have been indicated in the comparison table (Table 2). This assessment is also informed by reviews of the software where available, as qualitative user experience can differ from the intentions or claims of the developer.

Target User

CMSs designed to deal with the protocol needs of descendant communities may avoid some of the issues of off-the-shelf solutions that cannot accommodate specialized formats and usage, such as access levels based on spiritual role. This market, however, is very small compared to those created for heritage institutions or general use.. While there are communities that have designed a custom CMS, such as the GRASAC Knowledge System discussed in Chapter 2, these are developed to meet specific management needs and accommodate particular cultural protocols. They are generally not suited for external groups, even if the community is willing to share their database infrastructure.

Table 2: Summary of software cross-comparison.

	Target User	License	Cost (USD) ¹⁷	OS	Hosting	Media Support	Customizable
Collective Access	Museums	Open-source	Free	Windows, Mac, Linux	Third-party	Yes	Highly, multi-lingual
FileMaker Pro	General	Proprietary	\$329.99 and up	Windows, Mac	Local, web, third-party	Yes	Highly, multi-lingual
ICA-AToM	Archives	Open-source	Free	Browser	Third-party	Yes	Moderate
Microsoft Access	General	Proprietary	\$109.99 and up	Windows	Local, third-party	Some	Highly
Mukurtu	Descendant communities	Open-source	Free	Browser	Local, web, third-party	Yes	Highly, multi-lingual
PastPerfect	Museums	Proprietary	\$870 and up	Windows	Local, web, third-party	Yes	Moderate

¹⁷ As of March 2016.

Museums, archives, and libraries adhere to international standards of categorizing, labeling, and describing information. The Dewey Decimal System has been in use for over a century in classifying library books, and with the expanding role of technology in information management, other standards such as the Dublin Core for metadata have developed to manage digital data. These standards improve the ease with which institutions can loan and share their assets. Indigenous communities wishing to participate in such networks may find programs that automatically generate these templates beneficial. The lack of flexibility in customizing informational infrastructure, however, may exclude a community's preferred or required form of knowledge management. Additionally, mandates of accessibility and transparency embraced by many MLAs run directly counter to many descendant communities' needs for more controlled or private access (Becvar and Srinivasan 2009:426). While the market for heritage CMSs for MLAs is competitive, the pressure to adapt to institutional standards for ease of outsider accessibility also echoes the colonial framework of imposing epistemologies.

Museum collections management programs have functions to document objects in museum contexts, which may be extraneous for non-museum user bases (Krpmotich and Peers 2013:146). Modules that track donors or object loans may be integral to museum operations, but be irrelevant in the private digital archives of an Indigenous community. This can make such programs less accessible for Indigenous heritage needs, as collection management software is object-centric, while heritage may take intangible or more interconnected forms. Fields that document curatorial activities for tangible objects may serve no purpose for a community dealing with a purely digital collection. Compounding on this, museums often require functions the tracking of activities specific to museum operations (such as object loans and conservation efforts). While such features could be ignored if unneeded, they add an extra burden for a community with limited hardware capacity. Additionally, the process of determining which aspects of a platform can be ignored adds to the learning curve of mastering such a program.

Since general database applications do not adhere to one particular set of standards, they are a popular choice for small businesses that need the flexibility and

adaptability offered in database creation. This can make them an appealing option for communities looking either to tailor their system to meet their needs, or produce a more generic database. With such platforms, the onus is on the user to determine the level of customization. This requires some knowledge of database architecture, and depending on the user-friendliness of the software, knowledge of one or more programming languages. A database software package with no customization is less work and may prevent the experience of being pigeonholed into an institutional framework, but precludes its users from putting localized structures and protocols in place.

License Type

The software discussed in this chapter can be categorized into two broad groups based on licensing and acquisition: open-source, and proprietary. Proprietary software can be further divided into Software as a Product (SaaP), and Software as a Service (SaaS). SaaP developers typically provide only the software with the expectation that content will either be managed locally, or on the license holder's own server. SaaS products typically include hosting ("cloud storage") and an expectation of customer training and support. This type of software is usually browser-based and would therefore not require local installations¹⁸.

Online development communities support open-source software, and by its nature its code is at minimum viewable to the public. Open-source software with a license that permits modifications is called "free" (referring to the liberty to make alternations, rather than cost), and users are encouraged to view and change the program's code to meet specific needs. Free and open-source developer communities have found success in wrangling non-standard datasets and adapt existing code to suit specific needs (Boast et al. 2007:397). However, open-source CMSs are often less stable and less user-friendly than commercially produced software, and may be more vulnerable to security breaches (Nichols and Twidale 2003; Meike et al. 2009:44), a serious issue when handling sensitive information. Proprietary software is developed by

¹⁸ My survey did not include any SaaS CMS vendors, as the initial costs, often costing thousands of dollars, and monthly fees make them an unsuitable option for most small institutions and communities.

companies with financial incentive to provide stable, usable software, and may therefore be seen as more reliable, or at least liable if there are issues.

Both license types have benefits and limitations for Indigenous cultural management needs. Open-source software may better suit the budgetary needs of communities with restricted resources. The level of customization offered in open-source communities is also able to handle most protocol needs, but requires either the goodwill of the development community, or a high level of coding proficiency from its users. The dearth of user-friendly interfaces in many of these platforms may deter communities that want a CMS that is useable by multiple individuals, or who foresee personnel changes and require a transferable workflow.

Proprietary software companies may invest more into developing accessible interfaces, though each has its own learning curve. These companies can be reluctant to provide modifications to their products, as it can be a costly endeavour to reach a niche audience. Due to a competitive market, they are also more inclined to emphasize their own suites of compatible software and file formats that tend not to be easily integrated into other systems. Custom set-ups are possible in some of these databases, and independent developers offer such services, for a fee. For communities that want the flexibility to migrate their information into new systems as needed, or to collaborate with other groups, proprietary file formats can be a major issue, especially if this restriction is only discovered once the system is acquired and implemented.

Software Cost

Communities that lack discretionary funds may find that the price tags of many popular CMS platforms an barrier to acquisition. For communities dealing with pressing issues such as housing or healthcare, decision makers may not be able to allot funding towards less urgent needs, including digital information management. In this case, the prospect of open-source software could be a very attractive solution. Open-source programs are typically available at no cost (van Garderen 2009:3), while proprietary options cost anywhere from the low hundreds to thousands of dollars.

Some proprietary software has a one-time fee, while others, particularly those offering hosting and/or support, have service fees applied on a monthly or yearly basis. SaaS companies can be very costly when including the process of setting up the service and the monthly fees for customer support. Another point to consider is that the software package costs will likely not represent the total cost of implementing a CMS. Other expenses may include required hardware, third-party hosting, personnel, and training, which may add to both the initial setup cost and continuing costs to run some of the less expensive options discussed here (White 2002:35).

Most of the platforms surveyed in this study offer different price points for different software packages, with no base price running over \$1,000 USD. In providing the cost of a platform, CMS developers often offer a lower price for a very basic software package. Uses that fall outside of the expected pattern (such as multiple users with administrator privileges) can end up costing much more than the base package in the form of deluxe editions and add-ons (White 2002:35). For Indigenous user groups, it is very likely that the implementation of cultural protocols falls outside the expected use, and thus communities can expect to spend more than the basic package cost.

System Requirements

CMSs can be installed locally, or on a server for browser-based platforms. A locally hosted CMS is only accessible from the computer it is installed to, or it can be installed on a local server to connect with multiple networked computers. Browser-based platforms are a popular option in many industries now, as these do not require robust additional software or hardware to run, and can be accessed from anywhere. For web-based platforms, some CMS developers offer hosting as part of the software package, while others allow or require third-party hosting.

Just as high software costs are a complicating factor, the cost of purchasing and setting up new hardware for the sake of accommodating program requirements may be significant. Programs compatible with only one operating system may not be used often as those with cross-platform capabilities. Recent web use statistics show that Windows operating systems make up more than half of the user market (StatCounter Global Stats 2016); a platform that only runs on Windows is therefore more likely to be

compatible with an existing computer setup. However, choosing a system with a single operating system requirement will cause difficulties should a community decide to switch to a different operating system.

Multimedia Support

Whether or not a CMS supports files other than text is an important consideration in whether it can suitably handle heritage. Intangible heritage in particular may best be represented through multimedia (such as an audio file of an oral history). CMSs that do not support a wide range of file types may be unsatisfactory in representing heritage for community needs. For the purpose of cross-feature analysis, platforms capable of linking or hosting graphic, audio, visual, and text files received a “Yes” in the multimedia column in Table 2, while those that accommodate some but not all have a “Some,” which is explained upon later in this chapter when discussing the limitations of the specific platform.

Degree of Customizability

The ability to customize the ways that information is categorized, retrieved, and displayed may be a crucial component in a CMS for prospective users. While industries often rely on standardized metadata cores, a CMS suited for Indigenous communities should not force standards that are unable to represent different knowledge systems. The potential tension between the standard data structures and displays, and the need to accommodate unique, localized perspectives can be mitigated by customization options. Platforms that allow customization of user and viewer displays, as well as fields and formats for data entry, have been marked “highly” customizable in the evaluation table. Those that only allow for some of these modifications are considered “moderate” in customizability.

Multi-lingual capability is another feature I have indicated in Table 2. With so many Indigenous languages under threat of extinction, many communities and collaborators have looked to digital solutions for the preservation of language, as with the 60 communities partnered with FirstVoices project outlined in Chapter 2. Software that allows users to input and view heritage information in their native language can

enhance self-determination and sovereignty in defining and disseminating heritage information (Shepard 2015:10).

Software Analysis

After defining the features to identify and compare, I selected six platforms to survey. My goal was to provide an array of options that represented these features in different combinations. To select the platforms, I began by building a list of CMS software currently in use in British Columbia by community-run museums (Appendix A). I used this selection method to ensure that all software had some field-tested capability to manage tangible heritage items. While some museums use paper filing systems or simple spreadsheet programs, this study only examined software capable of creating relational databases. Programs that can only manage basic inventory functions are unlikely to accommodate knowledge sharing protocols, and cannot represent the more interconnected knowledge systems discussed in Chapter 2. With this list as a basis, I next looked at other available software marketed specifically to the heritage sector. I looked at CMS platforms intended for general use. From these options, I chose six platforms that represent the different license types, costs, and target user bases, in different combinations: Collective Access, FileMaker Pro, ICA-AToM, Microsoft Access, Mukurtu, and PastPerfect.

Collective Access

Collective Access (Figure 4) is unique as the only open-source application designed for museum collections and exhibits in this survey. It has an active developer community on its website and the code repository GitHub¹⁹. The platform is comprised of two components: 1) a back-end catalogue for managing museum collections, and 2) a publishing module, which allows users to easily create online exhibits to share. The front-end component allows access restrictions and passwords to be placed on individual assets. While it supports archival metadata standards, Collective Access claims to be capable of handling complex, heterogeneous data collections (Collective

¹⁹ <https://github.com/collectiveaccess/>

Access 2016). A review of Collective Access (Falk 2015) praised its ability to create complex, multimedia exhibits and for its user friendliness for site visitors.

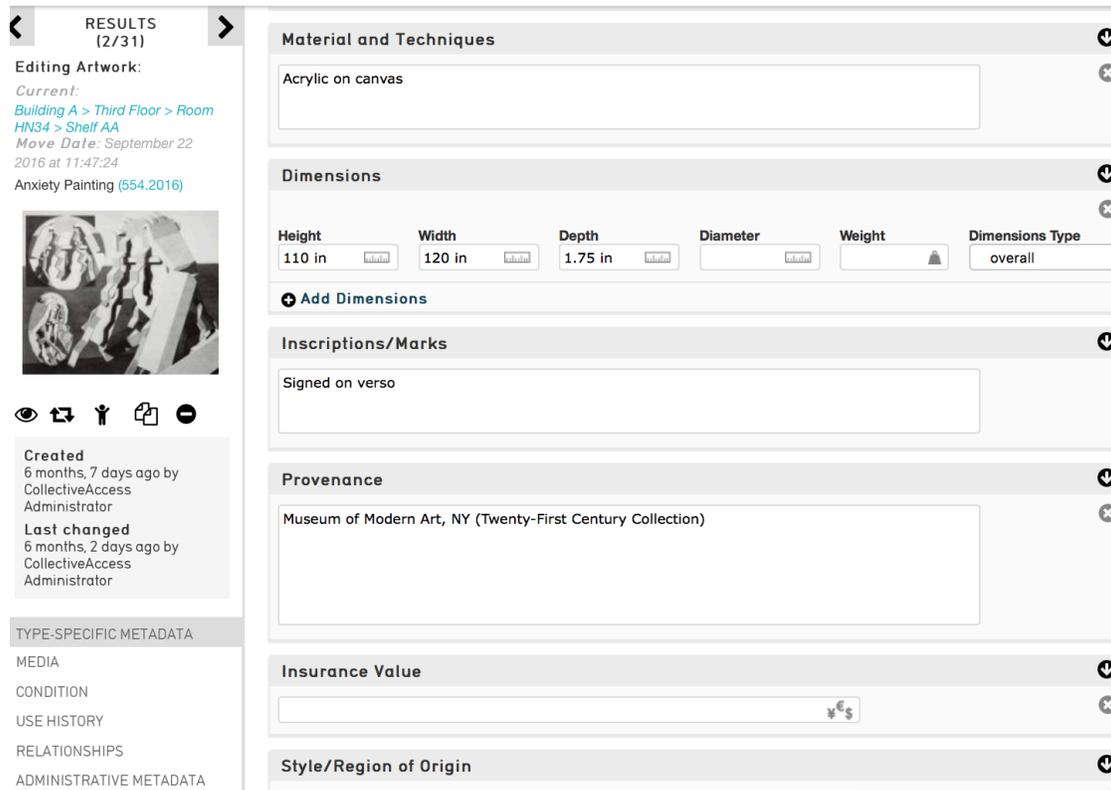


Figure 4: Collective Access screencap.
© 2016 Whirl-i-Gig.

FileMaker Pro

FileMaker Pro (Figure 5) is a general-use, proprietary database application. It boasts both user-friendliness through graphical interfaces and relational capabilities, and does not require any programming knowledge to use (Yerkey 2004:16). Databases created within FileMaker Pro have multiplatform capabilities between Windows, Mac, and online (and with the free Filemaker Go, can be pushed into a mobile application) (FileMaker Pro 2016). It may be purchased as a one-time software license for individual use, but multi-user licenses require monthly or annual payments. While FileMaker Pro allows the creation of multiple types of users with different levels of access privileges, one administrator must have the predefined Full Access Level, and privileges may not be set across multiple files (Yerkey 2004:24–25).



Figure 5: Screenshot of Filemaker Pro database.
 © 1994-2017, FileMaker, Inc, FileMaker International.

ICA-AToM

The International Council of Archives Access to Memory (Figure 6) tool was built specifically for archives and libraries that cannot afford proprietary software (Bushey 2012:2). As an open-source endeavour built in collaboration with its intended users, it is highly customizable to suit the needs of both large and small institutions. Prospective users are encouraged to download the software free of charge, and then modify it as they desire (van Garderen 2009:4). The ability to access and modify records is assigned individually to users with login credentials. Though not intended for collections management, it is in use by at least one museum in British Columbia, the Jewish Museum and Archives, for this purpose. However, with archives as its primary user base, its infrastructure is based on international archival standards. Bushey (2012:6) points out that it does not support nonstandard information formats.



Identity area

Reference code	ON00120 007-10
Title	27. Federal Building, Sudbury, Ontario
Date(s)	<ul style="list-style-type: none"> July, 1962 (Creation)
Level of description	Item
Extent and medium	1 photograph: col, mounted on slide

Context area

Name of creator	Steinberg, Israel "Irving" (1919 - 2011)
Repository	City of Greater Sudbury Archives

Content and structure area

Scope and content	Item is a picture of a downtown Federal Government building taken from across the street. Cars are also visible.
-------------------	--

Figure 6: Screenshot of Access to Memory database.
 Photograph © 1962 Robert Brown Ltd., Database © 2015 Artefactual Systems Inc.

Microsoft Access

A general-use database builder, Microsoft Access (Figure 7) offers flexibility and granular customization in the creation of desktop databases (Microsoft 2016). It is considered a relational database system of small to medium capacity (Yerkey 2004:16), and only runs on Windows operating systems. Knowledge of programming languages,

particularly SQL and Visual Basic, is required to take advantage of many of its features. Third-party developers offer services to build custom databases for regular use. Through the installation of Microsoft SharePoint, databases built in Access can be exported to an online format and accessed by multiple users. While some image and text files may be embedded or attached to entries in an Access database, it does not support a robust array of multimedia file types, and file sizes are restricted to 256 megabytes (Microsoft 2016), which rules out the majority of modern multimedia files.

The screenshot shows a Microsoft Access form titled "Accession Data with Pictures". The form contains the following fields and values:

- OBJECT: Book
- NUMBER: 81.06.001
- Picture Suffix: (empty)
- TITLE: Juneau Gold Belt Book
- MAKER: Spencer, Arthur C.
- USER: (empty)
- DATES: 01/01/1906
- CROSSREF: Hardrock/Placer/Book/Mining/Admiralty Island
- DESCRIPTIO: "Juneau Gold Belt" authored by Spencer. "Reconnaissance of Admiralty Island" authored by Wright. Historical introduction followed by Geography, Geology & information on major & minor mines including excellent maps & drawings. Book has been rebound in dark blue (oil cloth?) cover. 161 pgs & index, publications. Inscription: "USGS Pub #287 Arthur C. Spencer GP.O. Washington D.C. 1906" on inside cover.
- HEIGHT: 9 3/4"
- WIDTH: 6"
- DEPTH: 5/8"
- MATERIAL1: Paper
- MATERIALS: Ink, dye, cotton

Below the form, there are three image thumbnails of the book: the front cover, the spine, and the back cover. The back cover shows the title "JUNEAU GOLD BELT BOOK" and "A RECONNAISSANCE OF ADMIRALTY ISLAND". The file path for the images is shown as "g:\projects\cbj_museum\1981\81_06_001_F.jpg". The record number is 205 of 4960.

Figure 7: Screenshot of Microsoft Access client application.

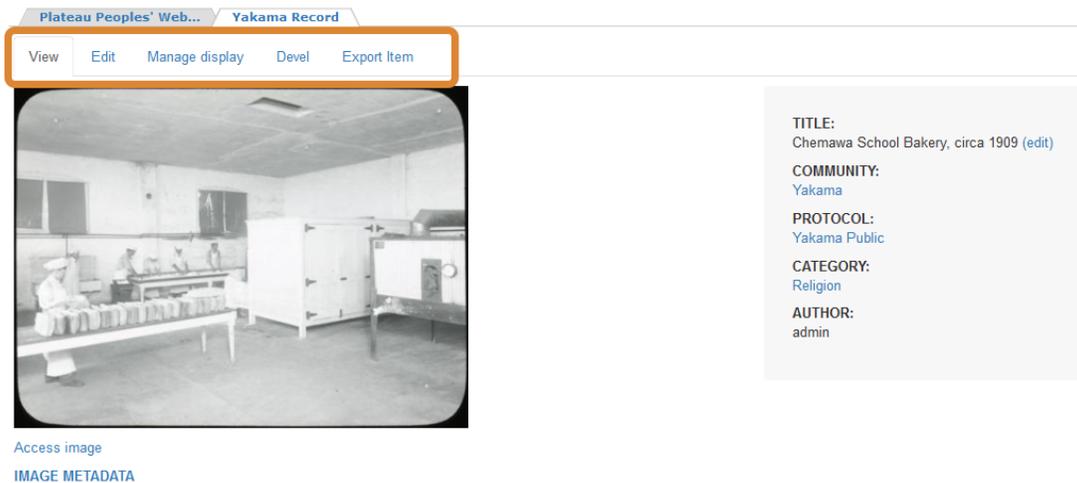
© Conrad Muller used under a Creative Commons Attribution-NonCommercial-NoDerivs 2.5 License.

Mukurtu CMS

Mukurtu CMS (Figure 8) is the sole CMS in this survey that was developed specifically for Indigenous heritage management. Its development was funded by the

National Endowment for the Humanities, the Institute of Museum and Library Services, and several other organizations (Mukurtu 2016). Mukurtu is free and open-source, and built on the existing open-source CMS software Drupal (Mukurtu 2016), and offers free support in the form of online “Office Hours,” webinars, consultations, and in-person workshops at conferences (though these may require conference registration to attend). A third-party review of the Mukurtu CMS (Shepard 2014) found the interface and workflow functional, though it should be noted that the reviewer is an academic specializing in computer systems for Indigenous language preservation. While Mukurtu does not offer hosting directly, they have partnered with a third-party service and offer walkthroughs for communities to set up their database online (Wynne 2016). Like several of the museum collection management software, Mukurtu’s developers emphasize developing functions for sharing content and creating online exhibits, and less on the behind-the-scenes database management.

Chemawa School Bakery, circa 1909



The screenshot shows a web interface for a digital collection. At the top, there are two tabs: "Plateau Peoples' Web..." and "Yakama Record". Below the tabs is a navigation menu with buttons for "View", "Edit", "Manage display", "Devel", and "Export Item". The main content area features a large black and white photograph of a bakery interior. To the right of the photograph is a metadata panel with the following information:

- TITLE: Chemawa School Bakery, circa 1909 (edit)
- COMMUNITY: Yakama
- PROTOCOL: Yakama Public
- CATEGORY: Religion
- AUTHOR: admin

Below the photograph, there are two links: "Access image" and "IMAGE METADATA".

Figure 8: Screenshot of MukurtuDemo.
© 2017 Washington State University Libraries

PastPerfect

PastPerfect (Figure 9) is the only proprietary software designed for heritage item management in this survey, as compared to other proprietary collection management software, it is not very expensive.²⁰ It is marketed as a small institution software package, with management capabilities for MLA collections. It can be installed locally on a Windows computer, or on a Windows server (Witt et al. 2010:12–13). Its modules are built to cover a wide range of collection types, and include support for oral histories (Price 2012) though it is not very customizable from the user-end. Many functions beyond basic cataloguing, such as multimedia support, must be purchased as an add-on (Carpinone 2010:70). A survey conducted among museum curators (Carpinone 2010:73–74) concluded that PastPerfect is among the most user-friendly applications, and with the technical support provided by the vendor, does not require most institutions to employ their own IT specialist.

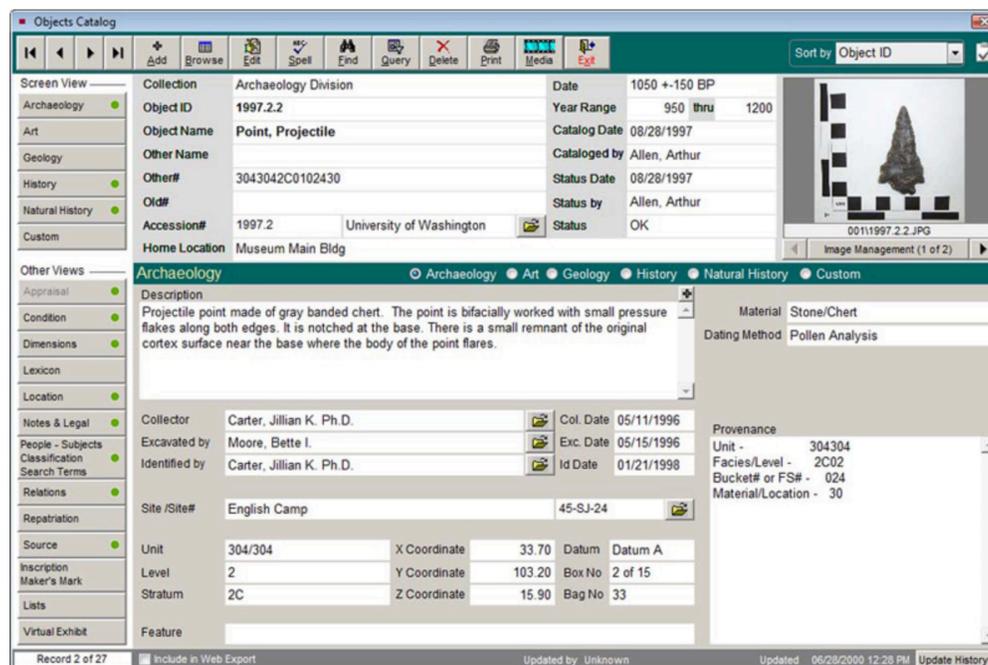


Figure 9: Screenshot of PastPerfect objects catalogue.

© 2017 PastPerfect Software, Inc.

²⁰ For example, Argus, a SaaS collections management system in use by at least one mid-sized museum in British Columbia, has an installation package fee of \$4000 USD.

Discussion

Table 2 displays the summary of this cross-comparison analysis, offering a snapshot of the kinds of options available for heritage management. In this section, I offer my thoughts on how communities may approach this market and find a solution that addresses practice needs and cultural requirements of heritage management. I also suggest which of the six platforms are most suitable given the different priorities or limitations a community may have. Putting myself in the role of a prospective user of a CMS allowed me to consider how these different features might affect my selection decision, as well as the experience of using these platforms for heritage management. This serves as a bridge between the conceptual issues of Indigenous heritage in digital spaces presented in Chapter 2 and real world instances of such software in action as examined through the interviews described in Chapters 4-6.

“Suitable, Good, Cheap: Pick Two”

The project management triangle is a model that illustrates the necessity of defining priorities in project management, where the balance between time, money, and skill dictates the scope of the final project (Sholarin and Awange 2015:52). A similar “trilemma” may be applied towards the task of picking suitable software for heritage management needs. As discussed in this chapter, there are many factors to consider in assessing the available options. While some restraints such as cost and ease of use may be universal, Indigenous perspectives introduce more unique concerns. In particular, the *suitability* of a software package for addressing knowledge and heritage management needs is a major point of consideration in selecting a platform. Short of building a program from scratch, a task beyond the reach of many marginalized communities, it is an issue that must be weighed alongside cost and quality.

As discussed in Chapter 2, large software companies are more likely to invest their time and money in products for a wider audience, Products developed for more specific markets may not have the same level of polish and user support. In theory, the fees associated with acquiring and implementing these platforms go back to the company and ensure the continued development and support of their product. Open-

source communities do not have such a pipeline for software updates, and instead rely on the enthusiasm and good will of the developers to ensure software remains useable.

Selection Strategies

Martin White (2002:36–37) recommends that businesses deciding between CMSs devise a checklist of required criteria. The Canadian Heritage Information Network (2012) offers such a checklist (see Table 3 for summary of criteria²¹) for museums to define and rank their needs in collection management software. Communities evaluating software may employ a similar approach by defining ahead of time the importance of software features and other factors. Using this list, communities have a way to measure the available options against their priorities and available resources. However, without prior knowledge of the typical capabilities of CMSs, it can be difficult to locate or develop a thorough list of expectations, and even more difficult to predict whether specific cultural protocol can even be enacted through a platform's capabilities.

One way that prospective user communities can better define their needs and identify the platforms that best meet them is to communicate with other Indigenous communities that have or are currently dealing with the same challenge. Organizations such as the Sustainable Heritage Network²², the Intellectual Property Issues in Cultural Heritage Project²³, and the Association of Tribal Archives, Libraries, and Museums²⁴ have created networks to connect Indigenous peoples as well as academics to discuss issues at hand and share advice. While a system that meets one user base's needs may not work for another, taking part in these discussions and gaining exposure to different platforms in use may be a very valuable contribution to the selection process.

²¹ Complete list available at <http://canada.pch.gc.ca/eng/1443120174242>

²² <http://sustainableheritagenetwork.org>

²³ <https://www.sfu.ca/ipinch>

²⁴ <http://www.atalm.org>

Table 3: Excerpt of Canadian Heritage Information Network’s (2012) Collections Management Software Criteria Checklist.

Management of Objects	Object Entry	Acquisition	Cataloguing	Risk Management	Loaning and Borrowing
Management of Metadata	Administration	Multimedia	Field Structure	Data Update	Indexing
User Interface	Help Features	Data Entry	Customization	Languages	Accessibility
Technical Requirements	Import/Export	Documentation and Support	Training	Features	Special Features

Surveyed Software Recommendations

For communities that prioritize cultural protocol and granular access control, Mukurtu is a promising platform, as it was the only option designed specifically for descendant communities engaging with heritage management. In addition, it is one of the lowest cost options when factoring in hosting fees and support. However, communities without their own technology staff may encounter difficulties setting up the database and maintaining it without consistent support from its developers. This may count against it for communities wishing to establish a self-reliant system.

If cost and user friendliness are high priorities, but the community can afford some flexibility in the way heritage items are organized and displayed, then Collective Access is an option worth considering. While hosting will factor in as a cost, Collective Access is well supported by its open-source community. Prospective users that are interested in creating digital displays, or collaborating with museums, will find the existing templates and functions the software package offers easier to approach than generating suitable set-ups on their own.

For the general-use database applications, FileMaker Pro offers significantly more advantages over Access, except in cost. Through its more intuitive interfaces,

robust multimedia support, and cross-operating system functionality, it is a much more flexible system that simply offers more options. Even a community with the time and expertise to build a custom Access database will still be limited by its file size capacity, which may be an issue if prospective users want to view digital objects from directly within the database.

PastPerfect does have its place in the list of software worth considering, despite many of its functions existing for museum operations, and its high cost compared to the other products surveyed. It was the most cited collection management software in my museum survey, and also in use by two of the communities with whom I conducted interviews. As paid software, its users can expect a level of reliable support and updates, more so than the software that is provided through the goodwill of open-source developers or academics as with Collective Access and Mukurtu. Additionally, PastPerfect has been built to accommodate heritage objects. As a company that targets the museum community, PastPerfect may well be open to adjusting its product in the future, as museums themselves shift their mandates from preservation and open accessibility, to a field that embraces collaborative efforts, repatriation, and non-hegemonic worldviews.

Summary

The cost of custom-tailored software is not viable for communities with more limited resources, both financially and technologically. The marketplace for content management systems offers ready-made solutions for both general and industry-specific needs, with a range of features and price points. However, few are marketed specifically towards descendant communities seeking to manage heritage in accordance with cultural protocols of access and use.

By surveying several platforms with a known capacity to manage heritage collections, I illustrated the types of choices facing communities approaching this marketplace. I selected factors that influenced the acquisition of the software, installation requirements, and adaptability to specific data management needs. It is more difficult to

quantify elements such as ease-of-use, though in my discussion of the different platforms, I have included third-party feedback where available.

The results of this survey do not indicate one clear “best” content management system for Indigenous heritage, but it does demonstrate the shortcomings of some, and from the results I suggest some general selection strategies. Prioritizing cost, usability, or flexibility is one way in which communities can narrow down the list of prospective choices, with the understanding that this entails a trade-off: a free and open-source option may have a less user-friendly interface than a proprietary option. The answer lies in promoting better dialogue between Indigenous user groups, and the software developers themselves.

By engaging directly with Indigenous communities to understand their needs in a content management system, developers may develop better strategies to make their software a more appealing option for culturally sensitive information. This can occur both in the development of the software, in its implementation, and through developing a relationship of support and feedback between the developer and the user community. Through encouraging this dialogue, Indigenous peoples may also have the opportunities to learn more about the capabilities of CMSs, and be able to define the criteria that enable them to pick the best given their knowledge system and needs.

Chapter 4.

Methodology

This chapter describes my approach to conducting research on the use of database and content management system software by five First Nations communities in British Columbia. First, I present the overarching aims of the research, and my approach to answering these questions through interviews. I then describe the process in which I determined the participant criteria for the interviews and recruited within this target population. The ethical considerations required for this type of research follows, as well as the steps taken in the research design to ensure these considerations were addressed. Next, I discuss my approach conducting and analyzing the interviews, and introduce the five First Nations that participated in this research: McLeod Lake Indian Band, and the Nations of Squamish, Stó:lō, Tsleil-Waututh, and Tsawwassen. I conclude with the acknowledged limitations of the study and the applicability of its results.

Research Design

Due to the qualitative nature of this research and the relatively unexplored subject matter, I have taken an inductive, exploratory approach to this project. Three main questions guided my inquiry.

1) What options exist for descendant communities to preserve and share aspects of their cultural heritage and history digitally, and how do their features compare to each other?

While the platforms analyzed in Chapter 3 have some measurable use in heritage management, they are not necessarily representative of the options in use by Indigenous communities. The results of this software evaluation provide some contextual background for the interviews in terms of the current status of the software market.

Similarly, the selected features have potential ramifications in an Indigenous stakeholder context, but this cannot be confirmed without input from such communities. The interviews conducted within the five participating nations answer this question more fully, by providing concrete examples of the software currently used for Indigenous heritage management.

2) How do cultural protocols affect Indigenous communities' willingness and approach to digitizing heritage?

Using software that does not adequately accommodate traditional knowledge sharing protocols including access and dissemination restrictions may limit the degree to which Indigenous communities utilize digital technologies in heritage management. The examples in Chapter 2 demonstrate some ways that traditional cultural protocol can influence the digitization of heritage in stakeholder communities. Understanding the extent to which technology is capable of accommodating the rules of knowledge sharing, and the strategies employed by First Nations to balance these rules with the available technology is critical to understanding the overall state of compatibility between the two.

3) How can software developers better work with communities to create solutions that allow information to be shared while respecting protocol?

One of my goals through this research is to demonstrate how through cooperative efforts between Indigenous communities and software designers, more accessible, protocol-friendly platforms may be created. Gathering qualitative feedback and user experience from First Nations members and employees who use heritage management software can help shape a roadmap of the benefits and potential pitfalls of implementing these systems. For this research, I am interested in both the use of the software itself, and of the relationship with the software developers. Based on the experiences of my participants and their overall satisfaction with the system in place, I offer recommendations to both prospective user communities and software developers for collaborating on more accessible software options.

The primary source for data to answer these three questions was from a series of semi-structured, personal interviews with employees and members of the five participating nations. The interviews contribute to illustrating the case study of the First

Nation in which each participant works and/or is a member, and how well the software in use serves the community as a whole. Thus, the research may be envisioned in two ways: 1) a case study of each participating First Nation, wherein the focus is on community needs and strategies in digital heritage management, and 2) a thematic analysis of the sum of the individual interviews, from which I form inferences about the suitability of CMS software for Indigenous use in general.

Population and Sampling

In this section, I describe the methods in which I defined my target population beginning with British Columbia First Nations and narrowing the parameters to more closely fit my research, and how I proceeded to connect with potential interview participants. I explain the reasoning behind both my sampling strategy and size of my study and how these contributed to the collection of relevant data that speak to my research questions.

Digital accessibility and intellectual ownership are global issues, as demonstrated through the examples in Chapter 2. However, for the purpose of this thesis, I chose to restrict my study to First Nations within British Columbia. This was done partially for the convenience of working on a local scale, but restricting the study geographically does have benefits for the research as well. Laws and policies regarding the sharing and storage of digital information vary regionally, and by limiting my setting to one province, I control for these external variables. Additionally, British Columbia has been the hub for several research initiatives concerning digitized heritage and related issues, such as the Reciprocal Research Network and the Indigitization Grant Program, and the Intellectual Property Issues in Cultural Heritage project. These programs have fostered communities of researchers and stakeholders interested in discussing and working on issues of digital heritage, and access to these networks has enabled me to more easily contact prospective participants.

There is no consensus on appropriate sample size in qualitative research, with suggested amounts as low as six for phenomenological or “lived experience” studies (Beitin 2012:244–245). Thus, rather than set a particular number as the target, I have

chosen saturation as the determining factor for sample size. Saturation, or thematic redundancy, is “the point when additional data fails to generate new information” (Braun and Clarke 2013:55). While saturation has determined the upper limit of interviews needed to conduct this research, the number of appropriate candidates at both the community and individual participant scale sets the lower limit. Thus I use purposive sampling, and more specifically convenience sampling, to select interview participants from within the rather broad population of “British Columbia First Nations,” and the more specific user group of “British Columbia First Nations using or considering CMS software.”

Purposive and Convenience Sampling

Purposive sampling is a non-probabilistic approach to selection often used in qualitative data collection (Guest et al. 2013:48). My decision to use non-probability sampling is based on the goal of producing deeply descriptive data based on individual experience and social context, which cannot be adequately targeted through calculating statistical significance. My research design requires that participants have the experience and background to speak to the challenges of managing digital heritage for British Columbia First Nations. As such, a random or probabilistic sampling strategy would not yield the same concentration of relevant and descriptive data. Therefore, I relied on my judgment and experience to determine the types of candidates that possess the knowledge to speak to my research questions.

Convenience sampling specifically selects participants who meet the relevant criteria as they present themselves, rather than targeting specific individuals. While I began with purposive sampling to describe my “ideal” participants, I used convenience sampling to locate the majority of interviewees. By participating in relevant workshops and conferences, I was better able to identify prospective participants. Convenience sampling also emerged from my efforts to approach the communities first for consent (discussed below), as I was often directed to the most appropriate individuals to include in the process by my initial contact.

Recruitment

The first step in identifying prospective participants was to start at the community level. Using academic publications on heritage management projects, First Nations community websites, conferences and social networks both formal and informal, I identified bands and Nations involved in digitized information. This included but is not limited to digital archives and exhibits²⁵, collaborations with institutions²⁶, and participation in training workshops²⁷.

For each potential participating communities, I determined prospective individuals to approach for the interview process. This was typically done through consultation with members of the community, often the point of contact for prospective researchers, who could best determine the most qualified and appropriate employees and members to participate. In some instances, I included participants who served as outside consultants rather than direct employees, so long as their work was at the request of the participating Nation rather than representing a self-directed, overlapping project.

In addition to community recommendations, I looked for individuals who had either some decision-making ability in the management of heritage items and/or information technology, or experience with implementing management solutions to these categories. These criteria ensured that the subsequent interviews were informed both by relevant knowledge and by personal experience, coming from the people who have current decision-making power to implement this technology. I tried to interview at least one person in the community with decision-making over heritage management strategies, one person with technological expertise, and one who could speak to the cultural needs of the community. In several cases, a participant had expertise in multiple areas.

²⁵ E.g., <http://www.digitalsqewlets.ca>, <http://www.virtualmuseum.ca/sgc-cms/expositions-exhibitions/danewajich/english/index.html>

²⁶ E.g., <https://www.rrncommunity.org>

²⁷ E.g., <http://www.fns.bc.ca/rimday/>, <http://www.indigenoumaps.com>

Ethical Considerations

Any research that involves data collection from human participants requires careful thought towards ethical research design and conduct. The bare minimum for ethical research must involve the participant's right to autonomy (including the ability to withdraw from the research at any point), and informed consent. I exercised these requirements through open communication with prospective participants, and a consent form that fully detailed the project's aims, procedures, and plans for dissemination.

I submitted my research proposal to SFU's Office of Research Ethics (ORE) and received approval prior to contacting any participants. While the ORE determined that the study carried "minimal risk" to the participants during the course of the interviews, it was nonetheless important to consider the potential impact on a larger socio-cultural scale, under both the ORE's guidelines and my own concerns. The bulk of the data for this project came from interviews conducted within First Nations communities; thus the impact of the research must consider risks both to the individual participants, and to the communities they represent. The key ethical considerations that my research needed to accommodate were engagement with Aboriginal peoples, confidentiality, and access to sensitive information.

The Canadian Tri-Council Panel on Research Ethics (Medical Research Council of Canada et al. 2014:109) calls for special consideration in designing research involving First Nations, Inuit, and Métis peoples within Canada. This is to ensure that their unique legal, historical, and culture standings are respected and not compromised by an outside researcher. I found the best approach to maintaining ethical conduct in this respect was to be transparent in my research goals and procedures, and to approach First Nations governance for permission to conduct interviews. Several communities provided their own forms for entering a research agreement, which I completed before seeking any individual interviews.

Offering confidentiality is an important step in ethical research conduct. Participants should not have to be concerned that their responses, or participation itself, could cause negative repercussions. However, the nature of the interview produced qualitative, and often unique information that could be linked back to an individual or

community by a third-party. The consent form I gave to participants prior to the interview included a selection of confidentiality levels for the final report. This includes total confidentiality where no identifying information is used, partial (selected identifying information is excluded, such as name or affiliation), and no confidentiality. If the interview was arranged under a research agreement with a governing body, then participants were also informed of this.

As several of my lines of inquiry involved the handling of sensitive or privileged material, the research protocol required careful consideration to ensure participants did not feel pressured to divulge such information. I designed my questions around the curation of heritage rather than the nature of any specific objects, and any discussion of privileged cultural knowledge were at the participant's initiation. To ensure that all information discussed would be appropriate for publication, I provided participants, as well as any community oversight committee (as per research agreements with a First Nation, and with the participant's knowledge) with transcripts of the interview for their review prior to including any data in my thesis or related publications. Additionally, participants had the option to revise or redact information they felt was inappropriate to include in the research, such as personal anecdotes involving third parties, or cultural knowledge that should not be shared widely.

Interview Protocol

The interviews, which took place between April and October of 2016 at the workplaces of each participant (see Appendix B for complete list), followed a semi-structured format, with key questions guiding the conversation rather than a strict question-and-answer session (see Table 4 for sample questions). The conversation centered around either the use of software for heritage management or the translation of cultural protocol into a digital format, depending on the participant's expertise. Some participants offered to demonstrate the CMS software to show the different features and customizations that we discussed. When scheduling interviews, I requested an hour with each participant. Most of the interviews fit within this timeframe, though some took more or less time depending on participant availability.

Table 4: Interview question schedule grouped by major research question.

Major Research Question	Interview Question
What options exist for descendant communities to preserve and share aspects of their cultural heritage and history digitally, and how do their features compare to each other?	Does your community use a CMS platform to manage your heritage digitally? Which one?
	If you do not currently use a CMS platform, have you had considered using one? Which have you considered?
	What other CMS platforms do you know about?
	What are the most important features to consider in selecting a CMS platform?
How do cultural protocols affect communities' willingness and approach to digitizing heritage?	Does your community have special rules about sharing aspects of your history and culture? How have you accounted for these in digital spaces?
	Are the digital representations of heritage (e.g., photos, descriptions, a/v recordings) subject to the same cultural protocols and restrictions as the real item?
	Have you made adjustments to sharing protocol to fit available digital platforms?
How can software developers better work with communities to create solutions that allow information to be shared while respecting protocol?	What do you like or not like about your current platform?
	What are some of the considerations you had for implementing a CMS platform for heritage management?
	What feature/lack of feature would deter you from choosing a CMS platform?

The interview schedule contained ten questions addressing content management systems and cultural protocol for digital heritage. Table 4 lists these questions, organized by the main research question for which they are intended to provide data. I did not strictly adhere to these questions within each interview, but rather used them as a guide to structure the interview, altering the questions based on the participants' ability to respond to each. Interviews with participants who had firsthand experience with selecting and using CMS software addressed the technical aspects at greater length and in more detail. Interviews with cultural advisors tended to be less focussed on the

software itself then on issues of protocol. With the participant's consent, I audio-recorded the interview to be transcribed afterwards for analysis.

I began each interview by prompting the participant to introduce themselves and their role within the community. Although I typically knew this information before scheduling the interview, this allowed the participants to define themselves to me, an outside researcher. Whether the participant chose to emphasize their technical or cultural contributions determined the types of questions I pursued. I generally allowed the participant to guide the conversation after raising a prompt from the interview schedule, asking follow-up questions where appropriate. Once I felt the topic had been exhausted, I moved to a new topic. Finally, once we had gotten through all of the relevant questions, I prompted the participant to add any additional information that had not been raised earlier, before concluding the interview.

Case Studies

The data from the interview portion of my research reflect the perspectives of members and employees of five different First Nations located in British Columbia. The following is a brief summary of each Nation, the individual participants, and their experience with digital technologies and information management. Unless noted otherwise, I conducted these interviews on a one-to-one basis, as opposed to interviewing groups of people.

The McLeod Lake Indian Band

I contacted Amber Ridington after seeing her presentation on the creation of a community archive and land governance tool for the McLeod Lake Indian Band, a Tsek'hene community in north-eastern British Columbia. Ridington began her work with McLeod Lake in 2004, when she performed a heritage resource inventory as part of their treaty process, followed by a traditional land use study in 2011. This work produced much in the way of images, audio files, and other heritage-related media, which led to the development of a centralized archive for better community management and access. Though I was unable to directly connect with McLeod Lake community members who

had participated in this project, Ridington shared her experiences building online heritage archives for McLeod Lake as well as the Doig River First Nation. A heritage consultant and Ph.D. candidate in folklore, Ridington also provided an academic perspective on the challenges of using technology and Western concepts of intellectual property in dealing with traditional knowledge, with a focus on free and open-source platforms.

The Squamish Nation

The Squamish Nation, whose traditional territory stretches from the Lower Mainland to the Squamish Valley and further north, customized a content management system in 2011 for land management use to deal with the high volume of referrals received on a daily basis. I learned of this initiative through the software developer's website. Through an introduction by Dr. Rudy Reimer/Yumks, SFU professor and member of the Squamish Nation, I met with two members and employees of the Nation who took part in the implementation of the software. Lisa Wilcox, senior Executive Assistant, and Chief Bill Williams, Lead Negotiator, worked with software development company Cloverpoint Systems to adapt their Insight Land Management System for use in the *Xay Temíxw* ("Sacred Land") Land Use Plan, a strategic initiative to identify and protect areas of cultural, spiritual, and environmental significance to the Squamish Nation. Wilcox discussed her experience with the administrative issues in designing and implementing the system with Cloverpoint and within her department. Williams talked about the overall plan for the system and its role in managing heritage. Wilcox also put me in touch with Brandon Thompson, a former employee of Cloverpoint who worked most closely with the Nation on the project, and now runs a public relations and media consulting firm. Thompson provided knowledge on the process of working with First Nations from both a technical and business standpoint.

The Stó:lō Nation

The Stó:lō Nation, a First Nations tribal council representing eleven Stó:lō communities of the Fraser Valley, operates the Stó:lō Research and Resource Management Centre (SRRMC) in Chilliwack. One of the guiding principles of the Centre,

which is displayed in part on a banner adorning the building's entrance, is "*S'ólh Téméxw the íkw'élò. Xólhmet te mekw'stám ít kwelát.*" ("This is our land. We have to take care of everything that belongs to us"). This mandate of stewardship applies to all auspices of the SRRMC's operations, which includes archaeology, archives and libraries, cultural events and education, land referrals, and more (Stó:lō Research and Resource Management Centre 2013). Digital information management is a key component of the centre's operations, as it allows the Nation to preserve and disseminate information more easily and on a larger scale. I interviewed three staff members of the SRRMC: Director and Senior Archaeologist Dr. David Schaepe, Cultural Advisor/Historian, Sonny McHalsie Naxaxalhts'i, and Librarian/Archivist Tia Halstad (with some input from Library Assistant Michelle Tang on her software use experience). Halstad and Tang provided information on the use of the PastPerfect CMS, implemented for the Centre's library in 2008–2009, while Schaepe talked about the larger issues of digital cultural information. McHalsie spoke of his experiences collecting and working with traditional knowledge for the Nation, and his work advising on digital projects, particularly the Reciprocal Research Network and the Sq'ewlets Virtual Museum.

The Tsleil-Waututh Nation

The Tsleil-Waututh Nation, located in North Vancouver, uses the PastPerfect CMS to manage their archives. The system was originally adopted in 2013 to organize records pertaining to a land claims court case. The system has since expanded to include much of the Nation's archives and records, although digitization remains an ongoing process. I approached Adrienne Morrison, records manager for the Nation, at an ARMA Vancouver²⁸ symposium for First Nations records and information management in February 2016 to discuss including Tsleil-Waututh in my case studies. I spoke with her and referrals analyst Michelle George at their office. Both were instrumental in setting up and populating the PastPerfect system from the original paper records, with Morrison applying her background in information management to the task. Morrison talked about both the practical challenges of records management, and more

²⁸ A non-profit organization that provides training, resources, and networking events for information for records and information management professionals.

specifically the application of a Western framework and software onto First Nations records. George, a member of the Nation, shared her experience in setting up and learning to use the system, as well as her thoughts on the role of digital and online technologies in sharing information on Tsleil-Waututh.

The Tsawwassen Nation

The Tsawwassen Nation is the only case study in this research that does not currently use any type of CMS for information management. I contacted their records analyst Jennifer Jansen following her presentation on the Nation's policies on freedom of information at ARMA Vancouver's First Nations records management symposium. Our interview covered these policies, as well as Jansen's past experience with records software, and current goal of locating an appropriate software system for the Nation's records. This interview offered a slightly different perspective from the four case studies with a CMS in place, as the nation currently has laws regulating the exchange of information, but has not yet adapted these protocols into a digital space. Working in a small department, Jansen was the only staff member to speak on the Nation's behalf, and we were able to cover a wide range of topics pertaining to her role there.

Data Analysis Strategy

I used the *inductive thematic analysis* method to analyze the interviews and find common themes in the matter of digital heritage management. Inductive thematic analysis is described as:

A rigorous, yet inductive, set of procedures designed to identify and examine themes from textual data in a way that is transparent and credible. Our method draws from a broad range of several theoretical and methodological perspectives, but in the end, its primary concern is with presenting the stories and experiences voiced by study participants as accurately and comprehensively as possible (Guest et al. 2012:15–16).

Thematic analysis is the most appropriate method of data analysis for this research as it allows the emergence of patterns while still preserving the unique perspectives and context provided in each individual interview. To explore the data and

form these patterns, the transcriptions undergo review for key types of data, which are developed into *codes*. This process is also known as the “familiarization” phase (Braun and Clarke 2013:204), as it allows an exploration of the breadth of the data. In thematic analysis, codes are developed with descriptive comments and free association rather than with a rigorously analytical approach (Braun and Clarke 2013:214–215). These codes are further refined into *themes* to allow for a wider cross-comparison. Effective themes allow for theoretical exploration within a single theme, and fit with additional themes to contribute to the overall analysis of the research questions (Braun and Clarke 2013:231).

I transcribed my interviews verbatim using the qualitative data analysis software NVivo. After completing and transcribing all interviews, I familiarized myself with the transcriptions, highlighting sections with potentially relevant data. I created broad descriptions for these codes, and grouped multiple sections under single headings (see Figure 10). After the first phase of coding, I grouped the codes together under broader descriptions, and repeated this several times until I could identify the larger themes from the interviews. These themes had direct relevance to my three main research questions, dealing with the role of heritage in information management and digital form, the experience, benefits, and concerns of using digital applications for heritage management, and suggested areas of improvement in existing technology. It is from these themes that I was able to identify and discuss the key issues present in digitizing heritage and cultural protocol in British Columbia.

Name	Sources	Referen...	Created On	Created...	Modified On	Modified By
▼ Concerns	0	0	Nov 10, 2016, 5:41...	SL	Nov 14, 2016, 10:0...	SL
Authenticity vs. p...	1	2	Oct 12, 2016, 10:30...	SL	Nov 9, 2016, 11:51...	SL
▼ Differences betw...	2	5	Oct 17, 2016, 3:48...	SL	Nov 22, 2016, 9:24...	SL
Developing pro...	1	1	Oct 21, 2016, 10:01...	SL	Nov 9, 2016, 1:59 P...	SL

Differences between western and native IP

Summary **Reference**

Reference 1: 2.92% coverage

Fortunately I think that the province understands there's an aspect of the relationship which disallows or moves us outside that piece of legislation, where people are requesting access to information and we're saying we can't get it, it's not permissible to give them that information.

Reference 2: 2.22% coverage

Absolutely, there are absolutely different perspectives on intellectual properties that fundamentally are different than Western traditions of understanding intellectual properties. And we've done work on that to educate ourselves and understand ourselves as the managers of this information, what's appropriate in terms of use, access and restrictions of use, and respect for the ownership of information.

Reference 3: 2.22% coverage

Some of the fundamental differences that I've become aware of are, there's a relationship between the individual and collective ownership of information, there's no expiry of the timeline, where an individual's information given to us will expire in fifty years and become part of a collective.

Reference 4: 2.22% coverage

There's copyright and ownership aspects of intellectual properties that continue on forever, that's the nature of their placement in an individual or in a family, or in some aspect of the broader collective.

NODES > Nodes > Heritage > Implementation in software > Concerns > Differences between western and native IP

Figure 10: NVivo screencap of coded data from interviews.

Limitations

This research by its nature produced data that is contextualized by the participants' perspectives and experience. Creating a standardized datasets was not the goal of the project, nor would such a thing be achievable given the unique variables each nation presented. The different software in use, its purpose in nation operations, and the number, role, and availability of individual participants resulted in detailed, qualitative data over broadly applicable results. Conclusions taken from this research are only confidently applicable to the communities studied within this project, not necessarily to other communities or regions outside of British Columbia.

Summary

I took a qualitative approach to exploring the issues of digitized heritage and software. Because this research looks at a specific type of software, content management systems, in the context of Indigenous heritage management, finding participants required non-probabilistic sampling methods to ensure the interviews would produce meaningful, relevant data. While I started with purposive sampling to find nations and other organizations using such software, I also used convenience sampling to seize on any opportunities produced through networking. This resulted in the participation of five First Nation communities and ten experts in the realms of heritage, technology, or both.

Beginning with the definition of the major research questions on the role of software in managing heritage, I constructed a methodological framework to structuring my interviews and processing the results. Taking into consideration each participant's background, I approached my interviews with a set of questions on the experience of using content management systems for heritage, thoughts on the role of digital technology in cultural contexts, and areas of concern in these matters. This produced highly descriptive data within the interview transcriptions. Using inductive thematic analysis, I reviewed the data to highlight sections of interest, and grouped these into more general codes and themes that directly contribute to answering the primary research goals of this thesis: identifying existing options in the content management system market; assessing how cultural protocols affect the use of this software for Indigenous heritage management purposes; and determining where there is room for improvement in the user-developer relationship.

Chapter 5.

Results

In the preceding chapter, I outlined the methods used in my research on content management systems in use by British Columbia First Nations, the results of which follow in this chapter. I focus on three topics. First, I present the individual experiences of using the three content management systems in use across the five participating nations: PastPerfect, Insight Land Management, and Mukurtu. The participants who have firsthand interactions with the software described what they did and did not like about the software, and its overall functionality. Second, I highlight the reasons for selecting a particular platform according to the community decision makers, considering the seven features analysed in Chapter 3. Finally, I summarize participants' suggestions for areas of improvement within the software use experience, which include both suggestions in software function, and in the relationship between the software users and developers. Attributed quotations from these interviews have been included with permission from the participants.

Software Use Experience

For participants with direct experience with CMS platforms, I asked about their positive and negative feedback with the specific CMS, as well as what they suggest developers work on to improve user experience. Responses covered the process of setting up the system, its day-to-day use, and its overall suitability in its intended use. As the Tsawwassen Nation does not currently use a CMS (Jennifer Jansen), and the Tsleil-Waututh and Stó:lō Nations use the same software (Adrienne Morrison; Tia Halstad), this discussion covered three CMS platforms in total: PastPerfect, Insight Land Management System, and Mukurtu.

PastPerfect CMS

Staff at the Tsleil-Waututh Nation and the SRRMC both praised PastPerfect for its ease-of-use in managing and retrieving information within the database. Michelle George, who did not have prior experience with archival or content management systems, said that she “liked how you could look up things and it would all come up right there...you could actually pull up a document and all the details...in one screen.” The SRRMC’s online catalogue, available to the general public, required a very user-friendly interface, and Tia Halstad reported that visitors to the site were able to navigate the PastPerfect portal with ease.

Adrienne Morrison, who set up the system for the Tsleil-Waututh Nation, also cited the intuitive backend user interface, which required no knowledge of software programming, as one of the main selling points of the system. She did note that without archival experience, the search function took some time to learn to use effectively. It was in the process of transferring from a paper archive system to PastPerfect that Morrison saw one significant shortcoming in this context. As a system primarily intended for museum use, she found the intended data hierarchy and lexicon “didn’t quite match up to what I knew from archives study,” which made her seek workarounds for much of the workflow intended by the developers. Michelle George also found the learning curve of setting up the system steep for someone with little experience in museum collections management.

Another noted positive for the PastPerfect CMS is its built-in modules for handling different types of collections. Though the Tsleil-Waututh Nation currently uses it only for archives management, it was selected in part because it is compatible with different types of datasets, and could one day be used for more general heritage management (Adrienne Morrison). Having multiple modules within one system also allows data to be standardized and interlinked across modules, a particularly useful feature for linking heritage information within the database. Morrison was particularly enthused about the oral history module, “which allows you to put in each audio recording one at a time...it’s really conducive to...oral history so there’s all of the correct metadata listed there,” which includes specific fields for transcription and interview length. Though the platform, has shortcomings in its applications for First Nations information

managements due to a lack of options to customize it from a product intended for museums, its ability to handle different information formats, particularly one so crucial to many Indigenous communities, is a promising sign to Morrison that the developers will continue to broaden their focus.

Insight Land Management System

Bill Williams and Lisa Wilcox both praised the Insight Land Management System developed for the Squamish Nation for its ease-of-use and its ability to handle multimedia. As a spatial database, Wilcox found it easy to locate specific areas within Squamish territory and quickly locate all the information attached to it, a feature she found particularly helpful during meetings. Williams saw potential in the software's ability to handle many file formats, including audio and video, as a way to embed traditional knowledge into the database. With hopes for the database to eventually be a repository for many aspects of Squamish culture, the program's ability to handle and play back multimedia was considered a huge advantage in creating a tool for a multi-faceted educational experience.

The biggest issue with the Cloverpoint-built system was due to the staff turnover the company underwent. While the initial team listened and responded well to the concerns and needs that the Squamish Nation expressed, the new team changed the original design to a less useful interface that did not incorporate many of the specific functions the nation had requested. Lisa Wilcox expressed frustration at this change, saying that there was "a lack of understanding of the sophistication of the decisions that we make." According to Wilcox, who had the most experience using the software, the new developers made assumptions about the workflows needed to run operations within the nation, and thus made the software less useful overall.

Mukurtu CMS

Mukurtu CMS has some unique features that Amber Ridington found noteworthy. As a heritage consultant for the McLeod Lake Indian Band, Ridington praised the handling of metadata within the database, which is built on two cores, or premade sets of metadata fields: the standard archival Dublin Core, and a custom Mukurtu Core.

Between these two cores, Ridington found that most heritage items could be adequately described. Another aspect of the metadata was the traditional knowledge field, a flexible text field community members could contribute their knowledge to, a feature that Ridington reported the community responded well to.

Mukurtu's overall focus on community contributions and dissemination meant that the McLeod Lake Indian Band exercised ownership over the resulting archives in creating, managing, and retrieving the information. The project participants "wanted it to serve the local community as well, because a lot of people don't have their own computers...and have someone who knew the system...put the restricted access or different access protocols on it" (Amber Ridington). From the feedback Ridington received on the project from the band, Mukurtu was a satisfactory solution in fulfilling these wishes.

Mukurtu is capable of handling many different multimedia formats, though videos required third-party hosting such as Vimeo or Youtube. While the process to embed video into the archive was streamlined, this, along with measures to protect the video through the database and the hosting service required "too many passwords, too many systems" for the community to manage. Another media type that the McLeod Lake Indian Band found lacking was geospatial data. Mukurtu is able to associate an entry with a single location, but nothing more complicated than this. For the archives, the community wanted the ability to run spatial queries to view all heritage associated with an area of land, which was not within Mukurtu's abilities. The McLeod Lake Indian Band discontinued active use of Mukurtu in 2014, and is now using Trailmark, a GIS database software designed specifically to link traditional knowledge to geospatial information (Amber Ridington, personal communication, 2017).

Though Mukurtu does offer more flexibility in access based on cultural protocols than most other software, it was not a perfect solution for the Tsek'hene Community Archive. One issue, noted by Ridington, is that Mukurtu was originally designed to handle social organization in Australian Aboriginal cultures. The protocols of the Athabaskan communities Ridington works with are based more on individual knowledge and rights than the privileges based on age, gender, or spiritual role. Ridington's "critique with Mukurtu is that I don't think they did a lot of user testing [outside of

Australian Aboriginal communities] before they rolled it out.” Ridington also found issues with the design of the platform, specifically the labeling of the different features and modules. Mukurtu’s terminologies assumed familiarity with the open-source community structure, which led to some confusion with the McLeod Lake users. Of particular note was the use of the term “community,” which within the platform refers to a user group. Ridington’s First Nations partners use the term to refer to their own, larger cultural groups, and thus found this vernacular difficult. As a workaround, Ridington suggested that Mukurtu extend its customizability to being able to change the labels on the platforms core functions as well.

In addressing the issues faced by the McLeod Lake Indian Band use of Mukurtu, it is worth noting that its development is an ongoing process. Since the migration of the Tsek’hene Community Archive to the Trailmark system, Mukurtu 2.0 has been released, and the team has long term plans to integrate more features including richer geospatial information.²⁹ The grassroots development model that Mukurtu follows allows the system to incorporate features pertaining to specific and unique community needs, but the drawback is that the timeline of feature updates may not match the timing of these communities’ needs for a functional platform.

Factors in Platform Selection

I asked participants what went into the decision making process to choose their management solution. While these nations differed in the intended application of these systems, available resources, and datasets, I found that the most important factors were very similar across all five (Figure 11). These also correlated with the factors analysed in Chapter 3, including cost, licence type, and usability.

²⁹ [https://github.com/MukurtuCMS/mukurtucms/wiki/Roadmap-\(Lite\)](https://github.com/MukurtuCMS/mukurtucms/wiki/Roadmap-(Lite))

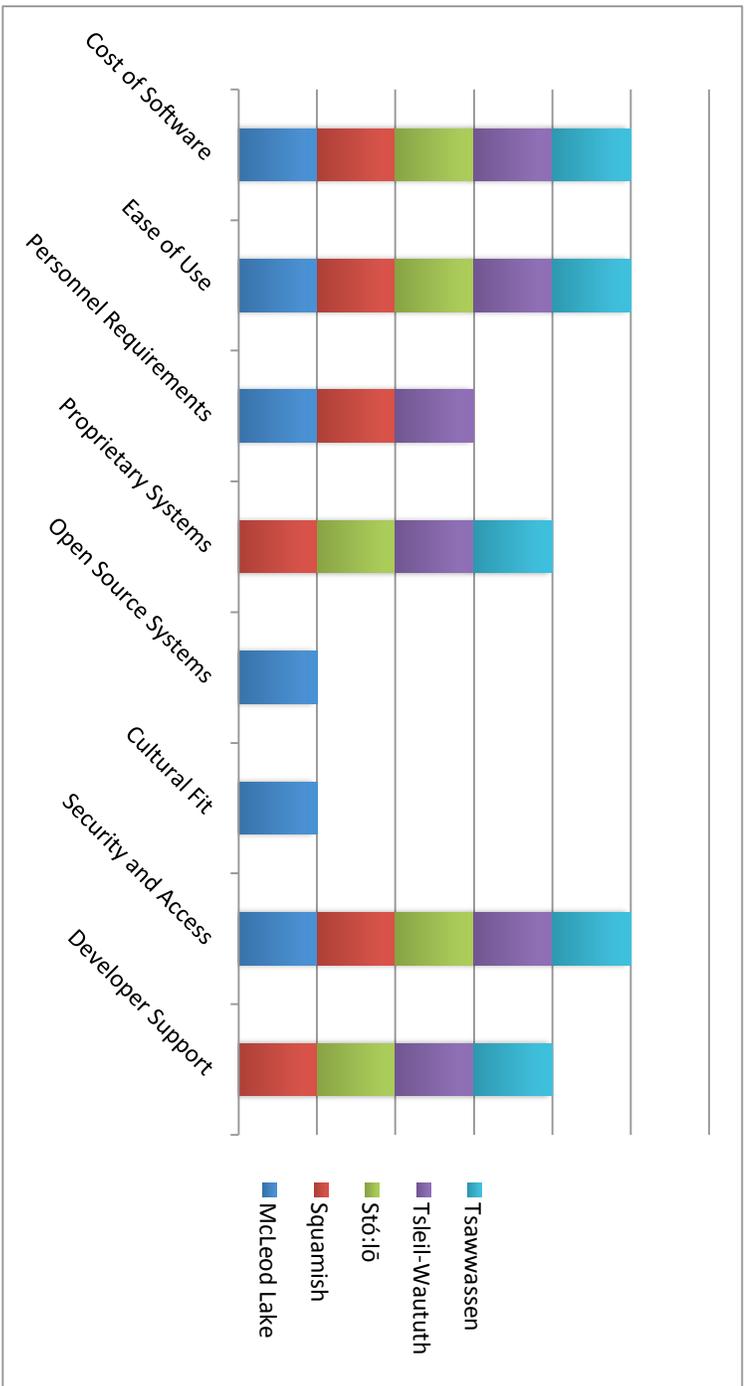


Figure 11: Key software features identified in case studies

Cost of Software

Financial considerations factored into the decision making in all five case studies. As previously discussed, First Nations often work with limited resources, and opportunities for funding in information management are particularly scarce. The Squamish Nation received some funding to implement the Insight System, but this carried with it an agreement to disseminate land referral decisions more openly with the British Columbia government. Without core funding for First Nations to build resource databases, Amber Ridington stressed that “the slow violence of colonialism that’s currently still in process with First Nations” will continue to hinder their ability to defend said resources on their own terms. With so many public sectors transitioning to digital information formats, Ridington found communities who lacked funds and training to upgrade at a significant disadvantage in asserting rights over their own information and resources

Nations that operate a system that has become technologically obsolete and to upgrade it to match the current trends in technology, may be denied funding on the basis that any system, out-dated or not, should be sufficient, in Ridington’s experience. Much of the funding offered to First Nations, she asserted, comes from academic institutions, and often carries an academic agenda rather than placing First Nations’ needs front and centre. Thus, as Ridington surmised, the means to acquire a suitable software package that enables nations to adequately manage heritage is both an issue of practicality, and a reflection of a deeper power structure.

Employees of both the Tsleil-Waututh Nation and the SRRMC cited the PastPerfect CMS as a cost-effective solution for their needs. Adrienne Morrison said that for the previous archivist, who selected the platform before Morrison was hired, in the Tsleil-Waututh archives “it was a little less expensive than some, so that was a factor because they were working off of a grant budget... and some of the archival software is fairly expensive.” Tia Halstad, in listing the features she liked in PastPerfect, added that it was “cost-effective as well” for the SRRMC. As noted in Chapter 3, PastPerfect is on the lower end of licence costs for proprietary heritage CMS packages. In addition, it does

not require an annual renewal of the license, which reduces the overall cost of the system.

Of the costs associated with implementing a system, the amount required to cover labour was frequently underestimated, according to a number of participants. Amber Ridington, in referring to available funding sources, lamented that “you can get funding for digitization, you can get funding for a computer developer...but to actually get the work that's needed to properly tag the information with...how the community wants it managed...is very different.” The money the Squamish Nation allotted to the Insight System covered the basic software and set up, but not the time invested by Lisa Wilcox and the other members involved on the project to consult on the software design and populate the database.

Jennifer Jansen stated that she has been looking for a solution for electronic documents for the Tsawwassen Nation. She is cautious about requesting the funds needed to implement such a platform, however, as the price of the software itself is only the beginning: “In IT it's not a matter of whether it can be done, it's a matter of whether you're willing to pay for it.” She added that navigating the expectations of the nation's leaders with the sum total, however, is a difficult task, as “they don't know what's involved, and that operating within a feasible budget while finding a system that satisfies the nation's needs requires clear communication between the administrators and the staff who would use the software.

Ease of Use

Matching the user-friendliness to the user base of a system was a necessity in the decision-making for all five nations, and one that depended greatly on the intended use of the platform. For example, systems designed for use in a band office, where only a few individuals would use it, could accommodate more specialized usage as long as its users had the know-how or could receive training. However, for a community archive, such as the one developed by and for the McLeod Lake Indian Band, the platform needed to be accessible to the entire community, especially knowledge holders such as elders and community leaders whose “knowledge of computers and technology isn't that detailed, and they're using it for just email and Facebook” (Amber Ridington). Ridington

envisioned the search function, which is a more universally recognizable software feature, as one of the primary modes of access, and planned its design to be as intuitive as possible. Jennifer Jansen also saw the search tool as the entry point for most users of a hypothetical Tsawwassen content management system.

Cloverpoint Systems spent a year and a half training employees of the Squamish Nation to use the custom version of Insight Land Management System, but Bill Williams hoped that the nation's general membership "would be able to access our information fairly easily, and get basic information on what's going on in our traditional territory." This would require either accessible learning tools for members of the nation to learn the system, or a very intuitive platform interface. Learning to use new software, particularly when working with important data, can be an intimidating task, as Michelle George experienced when she was learning the PastPerfect system: "I could find it a little bit intimidating at first, not knowing if I was doing the steps properly or saving it properly, but after I got used to it, it was good."

Personnel Requirements

For platforms that would only be used by select employees or community members, interview participants still considered the logistical issues of training and user functionality. Nations that do employ information managers often have only one or two on staff, including most of the case studies in this research. Amber Ridington experienced this difficulty in developing the Tsek'hene Community Archive; while she possessed the tech-savvy to build on the Mukurtu CMS, she did not "speak enough of the language to be able to manage the materials that way, and a lot of the community members who are good with computers aren't good with the language to that degree too." Finding someone who has both cultural and technology knowledge to manage a heritage archive was a challenge faced by many participants. Lisa Wilcox saw the ideal employee as a younger member of the nation who could learn the software and also advocate for the Nation's needs in liaising with the developers.

While it is more realistic to train a few personnel to manage a system than to expect an entire community to learn it, as Brandon Thompson put it, "you can train someone, and then they're gone six months later." Staff turnover also was an issue

noted by Adrienne Morrison, as the employee who selected the PastPerfect content management system for the Tseil-Waututh archives left her position shortly after, leaving Morrison with the task of implementing it without a guide. The danger of relying on one or two employees is that if those individuals leave, the knowledge becomes difficult to access. “We don’t always have trained people,” Tia Halstad told me, necessitating that their software is easy to learn. Lisa Wilcox took a preventative approach to this by actively working to decentralize the most important information within her department. Jennifer Jansen hoped to use more intelligent software to overcome any shortcomings, using an auto-classification system to remove the onus of training staff on formal records management schema.

Proprietary Systems

Three of my participating communities use proprietary systems for heritage management. The Tseil-Waututh Nation and the SRRMC both use the PastPerfect CMS, while the Squamish Nation has a customized version of the Insight Land Management System. Though neither of these platforms is advertised as Software as a Service, there is an ongoing relationship between the companies and their users. The nature of this relationship and the level of support it provides was the biggest factor in determining if the users were satisfied with their decision to use a proprietary system.

The Squamish Nation sought out software companies with a history of successful partnership with First Nations. In the early phases of their search, Lisa Wilcox communicated with her counterparts in other First Nations to see what was in use, and to the software companies to assess how well they worked with their clients. Cloverpoint had worked previously with the Huu-ay-aht First Nations to set up a custom instance of the Insight System. When they first met with the Squamish Nation, a key member from Huu-ay-aht took part in the meeting. For Wilcox, this became a significant influence in the nation’s decision, less because of the software itself, but because it demonstrated Cloverpoint’s ability to work responsively within a First Nation community.

Brandon Thompson, a former employee of Cloverpoint, offered his perspective on the nature of the developer-client relationship from his experience working with the Squamish and Huu-ay-aht Nations. He noted that as a small company that works

individually with clients to develop and support software, Cloverpoint had the opportunity to offer a different service model from larger developers. Thompson described the services Cloverpoint offered as twofold: “One of the tools is software, another is having someone near to help you get that paper into where it needs to go.” Part of this included the amount of time the company was able to spend with a client working within the community to establish specific community needs, a process that took a year and a half in the case of the Squamish.

Cloverpoint was additionally conscious of the burden of cost for upkeep. Clients could either pay for and maintain a single version of the Insight System, or, as the Huu-ay-aht did, choose an annual license that allowed the software to be updated continually (Brandon Thompson). The discontinuation of this license did not mean the removal of the current database, but that clients would no longer receive new versions. This allowed some flexibility in determining costs, though it does establish a reliance on the developer to continue to provide updates. Thompson added that databases that do not receive updates risk becoming obsolete, difficult and expensive to upgrade at a later time, and may be vulnerable to data breaches without security updates.

The SRRMC also chose convenience over cost when determining how to host their data. PastPerfect offers hosting services for an additional annual fee. After looking into the cost of internal hosting, Tia Halstad and her team decided to send their online catalogue to PastPerfect. While the company’s servers are located in the United States, and Halstad would prefer Canadian hosting, she is comfortable entrusting the data to a company she has established a good working relationship with, saying that “if we have a problem we just call. We so seldom need to call them, but when we do they're very helpful.” When asked about the options available through open-source licenses, Halstad asserted that she preferred “a commercial product that has the backing and people to call.” The exchange of money through a license agreement establishes a level of expectation that PastPerfect would provide the means and support to maintain a working database.

The partnership between Cloverpoint and the Squamish Nation had a promising start. Bill Williams and Lisa Wilcox both spoke positively of the process of developing the Insight System for the nation’s needs, and in particular Brandon Thompson’s role in

liaising between their department and Cloverpoint. Cloverpoint recognized the need to exchange with their client to understand their unique needs, and spent over a year working to implement these into the software design (Brandon Thompson). However, Cloverpoint declared bankruptcy in January 2016, leaving Squamish and the Insight System in an awkward position. While the system was largely functional, it had not yet been deployed for its intended use, and the nation no longer had the support to carry this out. When new owners acquired Cloverpoint, Wilcox met with the new team to discuss a new agreement, but was discouraged by the personalities she encountered:

I think that maybe when you're working with smaller scale company like that on something so large, maybe that's a risk that we didn't factor in, that it could happen with any company that we dealt with, that it's not something that's large and mass produced, like Microsoft Office programs that anybody can work with and design.

While proprietary licenses carry some expectations that the product will be supported, businesses still operate within the free market, and shakeups such as the one Cloverpoint experienced are still possibilities, as Brandon Thompson experienced firsthand. While a small company like Cloverpoint is more able to work one-on-one with their clients, the risk of losing this support is even greater. According to Lisa Wilcox, without reliable support from Cloverpoint, using the system, as well as dealing with any technical issues that may arise in its deployment, the Squamish Nation faces a difficult decision regarding the future of this software.

Open-source Systems

Although several interview participants had experience with open-source software, only Amber Ridington actively worked with open-source options with her client communities, using Mukurtu for the Tsek'hene Community Archive but also considering open-source land management tools such as 3Pikas³⁰ in her work. She spoke positively of open-source options as a cost cutting option with a responsive support community. The benefits of having multiple stakeholders from across the world working to improve existing software, and sharing these improvements with other users is certainly a benefit

³⁰ <http://3pikas.com>

to a First Nation looking for dynamic software with less financial investments. Other participants, however, expressed reservations in relying on open-source software:

I love the idea of open-source software. For years I loved playing with Android. Getting community built operating systems, I didn't understand what I was doing, but it worked four out of five times. And I think that's fundamentally the problem. You get a huge amount of minds focused on one particular thing, based on standards that are already established. When you're relying on security of something that needs to be absolutely airtight, people could lose their homes or money, there's a reason that banking software is not open-source...it's that four out of five times. What happens if it doesn't work?" (Brandon Thompson)

Thompson, a former employee of a proprietary software development company, succinctly summarized the core issue in open-source software in the above statement. While free and open-source options exist, they carry with them risk and hidden costs. When dealing with sensitive information such as sacred heritage, many Nations have determined the risk of an unsecured database is too high. "I can understand why a First Nation wouldn't want to use that kind of software right away", Adrienne Morrison commented, "because it doesn't seem secure...with PastPerfect we know it's established if we lose it for some reason we can get it again."

Without a dedicated team of employed developers working to provide patches and upgrades, there is a chance that something will break and be unfixable for the average user. Even if a system works well, there is always the risk that "the old versions become obsolete and you end up in trouble if...there's no other programs that can read it, so it doesn't make for very secure digital data" (Adrienne Morrison). Jennifer Jansen, in her role in the Tsawwassen Nation, had "no interest in learning how to be a coder...and it's too risky that it would break and we wouldn't be able to fix it, and you would have to end up spending a lot of money trying to find contractors to come in." When software ends up requiring paid specialists to continue to function, it may be simpler to budget for these expenses initially and purchase a proprietary system with developer support. "It costs more," Jansen continued, "but I think in the end it's worth while to spend that money for us."

Even if open-source software works perfectly, there are still costs associated with implementing a system. Quoting a popular saying about open-source, Jennifer Jansen

told me that when speaking of free and open-source, free “is free like a puppy, not free like beer. So the idea being that once you get the open-source, you have to take care of it, you have to spend money to keep it and maintain it.” Amber Ridington agreed that open-source software carries costs that might not be apparent at the outset, stating that “there’s always a cost” when accounting for hardware requirements, hosting, and training. However, she sees potential in the open-source community to produce sustainable database software capable of handling the unique requirements in Indigenous heritage management, at a much lower cost than many of the proprietary options available.

It is noteworthy that Ridington, coming from an academic and consultant perspective, was the only participant who was overwhelmingly positive about the potential of open-source software. Information specialists working with a band office have many immediate tasks at hand, and therefore it may be a worthy trade off to spend more money on software that runs and a service that supports it. It may be that over time, the open-source community will develop more reliable software and prove that the support exists even without an exchange of money, but for the moment, both time and money are resources these communities do not have much of to spare.

Room for Improvement

When asked about desired changes in management software as a whole, participants’ responses fell into two categories: technological, pertaining to software functionality, and social, the relationship between the community and software developers. In terms of improvement to software, these were specific suggestions for areas of improvement; comments on the social environment of heritage software solutions were both more encompassing and more common across these interviews.

State of Technology

Whether or not software responsive to the unique needs of Indigenous communities is possible depends on available technology, and the majority of participants were optimistic in this regard. Amber Ridington has been working in heritage

databases since the early 2000s, and recognizes that technology has become more accessible since her work developing a PERL-based catalogue. Ridington, as well as David Schaepe, noted that there are many more options in software now for specifically Indigenous needs. On top of this, the sheer number of options available on the market increases the odds that a community can locate a solution that meets their needs (Adrienne Morrison). In some cases, the adopters of earlier iterations of this type of software may have missed out on more suitable, current options.

The nature of technology is one of rapid change, and therefore it can be difficult to ensure a critical piece does not become obsolete. “We need to make sure things get migrated and stay current with technology”, Brandon Thompson urged. However, this can be difficult with Nations who struggle with funding and training capacity. Given the amount of work involved in setting up a system, having to redo the entire process to stay abreast of technological trends is a difficult requirement. While Adrienne Morrison was generally satisfied with the PastPerfect platform, she stated that “if I were going to start right now from scratch, and none of this was done already...I would look more closely into the ones developed for cultural heritage specifically.”

Amber Ridington wanted to see the increased use of wiki-style data entry so that individual community members may be more involved in building their own archives by directly contributed to the knowledge repository. While Mukurtu does operate this way, Ridington had not yet found a solution that combines folksonomic data entry with a robust geospatial system. Her ideal platform would combine the industry-focused land management tools on the market with this feature, and also allow for an easier facilitation of the consultation process. Geospatially-focused programs such as the Trailmark system adopted by the McLeod Lake Indian Band appear to be more in line with meeting both community and consultant needs in her work.

Brandon Thompson saw the ultimate limiting factor in this industry lying with people, not technology: “I think at the end of the day, it's all just ones and zeroes. Any company can make anything they want.” Thus, the onus is on developing good working relationships between developers and prospective users, and ensuring that smaller user groups such as First Nations have channels to express what their needs are. The rise of

social media platforms has helped to facilitate this (David Schaepe), but more formal partnerships may be required to make these changes.

While the participants for the most part did not encounter insurmountable friction between the concept of heritage and digital efforts to represent it, Amber Ridington sees some issue in the often-fixed nature of databases. Defining a piece of heritage in strict terms to suit a database's architecture may ultimately be "too formalized" to match some communities' protocols. While databases are generally alterable, she wished to see platforms that are user-friendly enough for communities to implement these adjustments as needed on their own, without the need of outside support.

Social Dynamics

Several participants pointed to prior knowledge of a program in use by another First Nation as a starting point for their own decisions. For example, Adrienne Morrison said that the SRRMC's use of the PastPerfect CMS was highly influential in the decision to use the software for the Tsleil-Waututh Nation. As the SRRMC deployed PastPerfect to manage their library, Morrison had some assurance that it would work in a similar environment at Tsleil-Waututh. As Morrison was in contact with Tia Halstad at the SRRMC, she also benefited from the advice of someone who had already gone through the process of setting up the program. The SRRMC was similarly motivated to look at the PastPerfect system because it was in use by the Chilliwack Museums and Archive (Tia Halstad), and choosing the same system increased the ease of data sharing.

Having software that worked with data from outside organizations served as a key point in selecting a content management system. The archivists of Mackenzie, British Columbia, located close to McLeod Lake, expressed interest in collaborating on a shared database of archival material, which necessitated that the Tsek'hene Community Archive would work with the system in place in neighbouring Mackenzie (Amber Ridington).

The grant that the Squamish Nation received for their digitization project required their system to provide information on land referral decisions to the province, and the Insight system proved capable of handling third-party compatibilities both to and from the

nation. The Squamish Nation was able to approach institutions such as the Vancouver Aquarium and collect GIS data; the Insight Land Management System seamlessly integrates these third-party layers with the data created and housed by the Squamish, and exports data out as well (Lisa Wilcox). The consideration of compatibility with external organizations, particularly non-First Nations ones, must also be weighed against the extent to which choosing one of these systems compromises non-Western cultural expressions of heritage. For the Squamish Nation, the Insight database strikes this balance of compatibility with an autonomous, self-determined and controlled system (Brandon Thompson), an advantage of a piece of software tailored to the needs of one Nation.

The social context of software acquisition and use that must be addressed to improve available software depend on developer and user outlooks, as well as a more general attitude towards information management. A key issue is the legacy of colonialism, and in particular the way collected data continues to be attributed to the documenter of cultural expressions, rather than the community itself. In speaking of an archive she developed in the early 2000s, Amber Ridington said, “all the materials are organized the way the ethnographer wanted it categorized, not the way the community thinks of it.” So long as software designers expect a Western style of attribution and copyright, inputting heritage with Indigenous concepts of ownership will remain a hurdle in using these more widely available solutions. However, as globalization continues to bring culture spheres into contact and collaboration, “people have melded traditions and cultures and knowledge and work within both worlds” (Amber Ridington). Improving software accessibility is not simply about making “Indigenous” platforms. It also requires developers to recognize the need for flexibility and customized schema.

One way to stimulate discourse on such issues is to bring together the communities that are working through them. As part of the recruiting process for this research, I attended several workshops and conferences that addressed issues in cultural heritage. The First Nations Records and Information Management Day, held in Vancouver in 2016, was one such event, and it brought together informational managers working in First Nations environments to share challenges and solutions to their work. Jennifer Jansen, who presented on the Tsawwassen Nation’s Freedom of Information and Protection of Privacy Act, believed that “the goal, to bring that [professional

information management] experience to a place where people actually in the trenches working in First Nations would feel more comfortable...succeeded. We got a lot of positive feedback.” Lisa Wilcox expressed a wish to see more such events available to her profession: “A gathering of people coming together to say what they do without a facilitator, so you're not having someone telling everyone what they should do.” As many of these events take place within an academic context, or function as workshops instead of an exchange of ideas, these more grassroots-style gatherings may ultimately lead to more productive conversation, as individuals like Wilcox could more easily bring their own needs and concerns to the forefront.

Whether using an off-the-shelf CMS like PastPerfect, or the more tailored Insight System, the biggest factor in whether or not participants were satisfied with their chosen platform was the relationship with the software developer. Because of the specialized nature of most First Nations' information management needs, developers must be willing to listen to feedback and offer solutions where needed. Brandon Thompson saw the key as “being on the ground with people, understanding what is sensitive. I know the industry complains about it all the time, that there is no one set or strategy that works other than ‘shut up and listen’.” The case of the Squamish-Cloverpoint collaboration is the clearest example for how the developer relationship can have the biggest impact on user satisfaction:

I think the original Cloverpoint was good because they knew how to listen, and what we wanted and required, and that made it work well. And that changed over time, as personalities changed and new people came in (Lisa Wilcox).

Amber Ridington agreed that “it comes down to...long term relationships with the community where they feel comfortable...it comes back to a mutual respect for the relationship.” A two-way understanding of what the community needs, and what the outside developer is capable of, is critical to successful partnerships. Misunderstandings can and have led to disappointment and suboptimal software, and part of the issue lies with developers' unfamiliarity with First Nations operations and needs. This is why taking time to work directly with communities, and more importantly, to listen and show enthusiasm for the work, is so important in these cases. As Brandon Thompson advised,

the steps are “finding out what people do or do not need, take the budget and teach people how to open windows.”

Summary

In this chapter I discussed the results of the interviews I conducted with members and employees of the five First Nations that participated in this project, focusing on the overall experience of using content management and database systems for heritage management. Participants who used the PastPerfect, Mukurtu, or Insight platforms shared their experience in setting up, learning, and interacting with the software within their role, and offered feedback on how efficient, intuitive, and suitable they found the platforms for their intended use. The cost of software and how well it was suited for daily operations were more likely to be deterrents to acquiring it than the potential to compromise these cultural values. The limitations of resources and need for a functional system were a bigger concern than conceptual issues of the treatment of heritage in digital spaces. More often than not, issues with a specific platform came from the need to adapt it from its intended use rather than an inherent incompatibility with Indigenous frameworks.

The discussions on room for improvement centred more on the flow of communication between user groups and developers, ensuring that needs that are not already addressed through the available software can be articulated and understood. Regarding the relationship with software developers, community members were more inclined to trust their data with a proprietary system, rather than risk security breaches of sensitive information, or sink limited time into setting up an open-source program. However, the nature of the relationship also depended on how well developers addressed and incorporated community needs, and the Squamish Nation in particular faced difficulties in communicating this. Influence from outside each nation had significant impact on the nation’s decision to choose a piece of software, and affected the overall experience of the platform in its use. Understanding the interactions of these different groups, and what can be improved upon, seems overall to be the biggest area of focus in improving the software experience for Indigenous user groups.

In the following chapter, I will continue to discuss the information gained from my interviews. My focus will be on the themes that developed from my analysis that indicate how heritage is viewed by source communities when it is digitized, and what potential my participants see in using digital tools for heritage management.

Chapter 6.

Discussion

In the preceding chapter I presented data from my interviews to illustrate five First Nations' approaching to implementing content management systems into their daily operations, and the participants' general experience with their chosen platforms. In this chapter, I use these interviews to discuss the broader themes of Indigenous heritage in digital formats. I first identify and discuss the perceived roles of heritage and how these function in digital spaces. I then turn to the discussions on integrations Indigenous knowledge into Western software frameworks, and challenges and existing points of tension in doing so. The final section is a discussion on the overall viability of digital databases in the service of heritage management according to participant feedback, as well as my own observations in conducting this research.

The Role of Heritage

In Chapter 1, I argued that while physical objects can be a part of cultural heritage, heritage itself is ultimately an intangible construct. It is an ascription of cultural value and identity to an object or expression, rather than the object or expression itself. When discussing the role of digital information, an intangible concept itself, the extent to which digitized information constitutes heritage is an important point to explore. What purpose this information serves, how closely it reflects traditional forms of heritage (e.g., ceremonial masks, oral histories), and how it is handled in digital spaces are all important aspects to consider when assessing the process of digitization in heritage management.

As my interview participants came from a wide background of expertise, often working in very different capacities for their respective nations, I inquired what within

their purview they considered “heritage,” and what role heritage played both in their work and within the nation’s operations. The label of heritage was applicable to the majority of information used in their professional capacities. For some, heritage was explicitly defined and applied to the information in question. For others, the connection of information to heritage was less explicit, but could encompass anything from court case transcripts to land parcels.

Heritage as Identity

The link between heritage and cultural identity was strong in several of the interviews, and worked in both directions. Information could be classified as heritage based on its relevance to the nation. As Adrienne Morrison, records manager for the Tsleil-Waututh Nation summarized, “anything...that references the Nation in any way is considered a cultural heritage record.” At the same time, many participants, particularly Indigenous community members, highlighted the importance of heritage to community adhesion. For example, cultural advisor Sonny McHalsie emphasized the role of heritage in reinforcing Stó:lō ideals: “We need to know within ourselves and look at aspects of our culture and tradition that help us define what is our unique relationship to the land and everything that's around us.”

Heritage both defines and is defined by its connection to cultural identity. Thus, using digital tools such as websites allows participating communities to express history, values, and cultural pride to the outside world. In reflecting on the aspects of Tsleil-Waututh heritage she would like publically available, Michelle George said “there's also history connected to those pieces and oral history stories to share and explain a lot about the Nation.” George, a member of Tsleil-Waututh, expressed a desire to use heritage as a way of promoting greater understanding of their communities. While much of the discussion in Chapter 2 addressed efforts to safeguard Indigenous heritage by regulating its accessibility, it is not always the case that communities wish to keep their cultural knowledge from the public eye.

Heritage as Responsibility

Along with its role in defining community and identity, the idea that heritage is something to assign ownership and protection to also came up in several interviews. The SRRMC and the Squamish Nation hold stewardship over the land as a core guiding principle in their operations, with the SRRMC's mission statement³¹, and the Squamish Nation's Sacred Land Use Plan³². David Schaepe, director of the SRRMC, though not a member of the Stó:lō Nation, sees that "culture is central to the guidelines that we follow, for the practice of the work we're doing across the board," and this applies to both the philosophy of the SRRMC as well as its day-to-day operations "taking care of the knowledge."

Stewardship, the principle of responsibility to conserve, protect, and otherwise manage resources (Lynott 1997:593), is not only a tenet in safeguarding heritage, but has practical applications for its stakeholders. The types of information managed by the nations that participated in this research often emerged out of processes such as treaty negotiations (Jennifer Jansen) or land-use studies (Amber Ridington), or had the potential for such use in the future. Stewardship of information can also lead to acts of preservation on tangible heritage, as the gathering of knowledge "is to ensure that you know where your ancestors picked berries, or where they hunted, or where they fished or where they gathered cedar bark. And once you find out those places there's the obligation that you have to go out to those places and do that" (Sonny McHalsie). Preserving information for such purposes was another motivating factor for all participant nations, and for the majority of these communities, was the incentive under which they sought a management system in the first place.

In some cases, the potential for cultural information to have some future purpose, such as land referrals or court cases, was a source of tension in the preservation process, particularly when storage capacity was an issue. While digital files take up no physical space, hard drive capacity may be a limiting factor. Adrienne Morrison, archivist

³¹ <http://www.srrmcentre.com/rightstitle>

³² <http://www.squamish.net/about-us/our-land/xay-temixw-sacred-land-land-use-plan>

for the Tsleil-Waututh Nation, pointed out that the obligation to preserve any and all information may place undue strain on data storage capacity:

I think a lot of First Nations are told to keep everything, because you just never know...It's not an ultimatum of "keep everything forever" but I think a lot of people think that it is so they end up hanging on to quite a bit. Which actually makes it really hard to separate out what's really important for heritage and what's not, because there's so much material...so it makes it really tough to weed that stuff...you start thinking that everything could relate in some way and you start drawing these conclusions, but ultimately it's not all heritage information, it's not all cultural information.

In cases of limited hard drive capacity, a conservative approach to stewardship wherein any and all information is retained for unspecified future use may place a great burden on communities with limited resources. The stakes of losing information with both practical application and significant value to cultural and spiritual wellbeing creates a much more challenging dilemma for such communities. Thus, the challenge facing information managers within Indigenous operations must have a clear idea of what constitutes irreplaceable cultural knowledge, what is expendable, and how these decisions may impact the knowledge available for future generations.

Heritage as Privilege

Another aspect of stewardship in practice is the degree to which the responsibility over heritage created feelings of privilege. In some cases, with stewardship comes improved or exclusive access to the knowledge, for “where there's a value in knowing a location of this site, that value comes in our ability to share that with other...people, where there's a need for managing that information” (David Schaepe). The drawback to this is that responsibility over information can spur feelings of personal investment or ownership, which can be counterproductive in efforts to increase access. Lisa Wilcox, executive assistant for the Squamish Nation, encountered such resistances when her department first introduced their centralized management system, as staff members who had previously been the sole caretakers of aspects of the database felt a loss of control over “their” knowledge as other employees were granted access to it as well.

Stewardship has become a central aspect of the heritage management field in recent years, finding itself in the codes of ethics for archaeologists³³, curators³⁴, and other heritage professionals³⁵. For the source communities it is just as important, if not more so, as the original and continuing caretakers of these types of knowledge. When heritage is simultaneously claimed and safeguarded by a community, it is understandable that stewards within those communities would exercise caution with their charges. Digital preservation and its application in protecting and managing heritage information makes it an attractive option in this endeavour, though the act of digitizing heritage and managing it presents its own challenges in assessing what of it constitutes heritage, and how responsibility over its management is divided.

Heritage as Information

The value of heritage for its potential to inform community members or the larger world was another aspect that came up in several case studies. In particular, several participants expressed a desire to use such information to educate their non-Indigenous neighbours about the land, its history, and the community's connection to it. The potential modes of dissemination through digital and online means have particular interest to participants, due to the capacity to reach more people in dynamic, innovative ways (Amber Ridington; Sonny McHalsie; Tia Halstad).

For Bill Williams, there is an immediate need to make this information available through Squamish's land referrals process. The nature of Vancouver's rapidly developing real estate is of constant concern in protecting Squamish's traditional territory, and in the past urban development has disturbed ancestral burials. Public education is one preventative measure to help protect such areas of cultural sensitivity, by informing land developers and potential residents of the history of the land. However the Insight Land Management System also allows Williams and his colleagues to identify

³³ <http://www.saa.org/AbouttheSociety/PrinciplesofArchaeologicalEthics/tabid/203/Default.aspx>,
<http://canadianarchaeology.com/caa/about/ethics/principles-ethical-conduct>

³⁴ <http://archives.icom.museum/ethics.html>

³⁵ http://www.tourismvi.ca/wp-content/uploads/2014/01/CTC_SustainableTourism.pdf,
<http://www.pch.gc.ca/trans-trans/eng/1365592714960/1365594956848>

sensitive and sacred areas to third parties without needing to disclose privileged information, through limiting the level of detail viewable to proponents outside the nation. In speaking of the appropriate use and treatment of heritage, David Schaepe is optimistic about the role of education: “My experience is that people tend to be fairly respectful if they're aware, and so a lot of it is education, and making it known that there's certain aspects of behaviour that are acceptable, and certain behaviours that aren't acceptable.” Jennifer Jansen, records manager for the Tsawwassen Nation, has a similar conclusion, stating that, “for the most part especially if you explain the cultural principle behind why, most people are understanding.”

Sonny McHalsie sees heritage information as a way to bring people into the landscape, such as with tours of Stó:lō traditional territory he regularly leads. He notes that place names, a central part of his research, bring people to the land “so people can actually see what those places are because all the place names have different types of meanings to them.” Knowledge that can be disseminated from digital platforms serves as a tool to bring people closer to the land, and Sonny hopes that the SRRMC’s library catalogue, as well as online representation can be part of forming this connection.

Much of the types of data my participants are responsible for do not, at first glance, appear uniquely “Indigenous,” or even “heritage.” Interdepartmental memos, court transcripts, and land use plans would not be out of place in many office settings, yet these types of documents, as well as the many forms of multimedia managed through these platforms, exist because of Indigenous peoples and concern them in critical ways. This distinction must be acknowledged when considering best information management practices. A one-size-fits-all approach is unsuitable in respecting the sovereignty Indigenous communities practice over their history, heritage, and ongoing ventures.

A theme emerging from these discussions was that information, explicitly defined as heritage or not, had some functional application in its inclusion within a database. Because these platforms were acquired to serve a use within each community, it followed that whatever data populated it would assist in this use. For instance, GIS data on Squamish territory in the Insight Land Management System inform the Squamish Nation on sensitive sites that may be affected by civic development. Photography

included in the Tsek'ehene Community Archive offer members of the McLeod Lake Indian Band the opportunity to view and comment on visual records of their people's past. This does not, however, mean that all heritage must serve some predefined purpose, or even that heritage in digital forms must do this. The implications from these cases are instead that "form follows function" – that is, the purpose of implementing a content management system dictates how the information within it will be used.

Indigenous Heritage in Digital Spaces

The social environment emerging from current digital technologies present both challenges and opportunities in the effort of digitizing heritage information. Because of the globally connected nature of the technology industry and, more generally, of the users of online platforms, trends in software design, as well as user behaviour, spread quickly and widely. This can leave less represented user groups overlooked by the majority of software developers. In the push for open access information, these trends can run directly counter to cultural and sacred protocols.

Participants in this research spoke both to the benefits and challenges of ingesting heritage into digital spaces. Some of the concerns stated across the interviews were on how the process of digitization may alter heritage or its role in the community. This is not a new concept in the larger context of differing knowledge frameworks, which I discussed Chapter 2. Many of these issues were reiterated, however, through conversations with participants. Employees with hands-on experience with the software also discussed the challenges of managing information in a way that appropriately described and managed the information according to community needs. This also included the security of the data, which often needed to be balanced against making it accessible where appropriate.

Digitization

Tia Halstad, archivist for the SRRMC, identified digitization as merely the newest in a series of media formats that have been applied to traditional knowledge: "When one of the *sxwoxwiyam* - one of the stories of long ago is told - it's told in a specific way for a

specific audience at a specific time. So if you capture that on a recording, it's only authentic for that instance." However, with the mandate to preserve oral histories in a time when traditional storytellers are disappearing from the community, digitization is a necessity to keep this information from vanishing entirely, even if it is not available in the traditional form.

Because these software systems are intended to house and represent heritage information, several communities specified requirements for the treatment of these digital surrogates. The McLeod Lake Indian Band required their archive to support multimedia, to improve accessibility for a community steeped in oral traditions (Amber Ridington). The Squamish Nation also intends to use audio recordings in addition to text for place names, to ensure that users can learn the correct pronunciations of locations, a feature that is supported in the Insight System (Lisa Wilcox). Bill Williams also sees multimedia such as images as a necessity in the full realization of the system's use in the Squamish community: inspiring members, particularly young people to go beyond the computer and seek out these locations in person. Expressing heritage in audio and visual forms is instrumental in more fully representing it, but Williams' hope is that it will lead to a connection with the physical land.

The traditional presentation of heritage was of concern to Sonny McHalsie as well. As the SRRMC's Cultural Advisor, he has spent much of his career collecting stories from Stó:lō elders, whom he identifies when he relays the stories in an "oral footnote," verbally acknowledging the original storyteller. This technique serves Stó:lō oral traditions in much the same way citations do in academic texts, creating continuity and a mode of verification, and "ensuring it was ours." Even though an audio recording of an oral tradition is not the same as being told the story in-person, McHalsie was clear that the footnoting must be maintained in some form, stating that "a lot of our culture is being slowly lost, shortcuts are taken...and it's just like the integrity of it is being lost." McHalsie implemented a version of his footnotes in the Sq'ewlets virtual exhibit, attaching a blurb to certain stories that credits the original storyteller and explains the cultural context of the story. While digitization is a transformative process, identifying and protecting the cultural aspects that assure meaning and relevance can help in the creation of a useable heritage database.

Despite its complications when used for heritage management, digitization is a necessity for the operations of the participating nations. It is a central goal of the SRRMC, as “the knowledge is useful to everybody, and our objective is to make it accessible and useful to everybody for whatever purposes they need it for” (David Schaepe). The McLeod Lake Indian Band saw a similar advantage in creating PDFs of some of their library collection, which increased both the accessibility and the amount of time community members could spend with the information (Amber Ridington). Digitization can also increase the preservation of information, as it would exist in some form even if the original were lost. Thus, the balance between the benefits of this preservation and the alterations and loss of authenticity is at the heart of many of these projects, affecting if and how heritage information becomes digital.

Ownership and Attribution

Amber Ridington went into great detail on the challenges of introducing Indigenous knowledge systems into digital platforms, speaking both generally and within her own experience. These issues centered on the differing concepts of “ownership” and how well these concepts fit within primarily Western frameworks. In the case of the Tsek’hene Community Archive, the process of adding information with discrete owners necessitates a codification of cultural property that previously had been more flexible. Ridington stated that “to do that dialogue between six bands, one tribal organization and thousands of people, that’s been the challenge so far.”

“The biggest problem,” Jennifer Jansen explained, “is when you get a disagreement in the community about what [ownership recognition] needs to be...where one family thinks the process should be one thing, and another family thinks it should be another thing, you have that disagreement. That’s where you get into the more difficult decisions.” Brandon Thompson, liaison between Cloverpoint and the Squamish Nation, speaking about his general experience working with First Nations and software implementation, had similar experiences: “There can be in-fighting, or at least that was a concern, though [Cloverpoint] never experienced it. Having witnessed it on every other level in communities, it’s not something you want to be caught in.” Assigning ownership

to heritage can be a difficult decision, and when the process is up to community interpretation, this can further compound the issue.

Rules of ownership that fall outside of Western traditions can also be challenging to integrate into a database. Athabaskan peoples, who include both Dane-zaa and Tsek'hene communities, have “non-hierarchical, bilateral social organization based on individual knowledge” (Amber Ridington) that are challenging to integrate into Western notions of ownership. The Doig River First Nation (2007) created a Virtual Museum of Canada exhibit³⁶ on Dane-zaa stories and songs, and those who first dreamed them.

The performers of these songs, known as Dreamers, are not thought of as the creators of these works; instead, Dreamers receive these teachings from Heaven to bring back to the community, and serve as spiritual performers and prophets. The inclusion of Dreamer songs prompted much discussion among the Doig River First Nation on the role of Western intellectual property concepts because as Ridington explained “they also don't want to lose out on copyright and intellectual property rights... working on that project really brought out a lot of the intellectual property concerns around digital media and heritage.” The notion of ownership over these songs and stories fit imperfectly with the Western legal frameworks, and, in addition to misconceptions of what intellectual property laws can and cannot protect (Anderson and Christen 2013a), can hinder the effort to create sound legal protections for heritage such as the Dreamer songs.

Even where a nation did agree on the person or persons who could claim ownership over an aspect of heritage, this did not always translate easily to existing software databases. One major concern among Stó:lō community members was the proper attribution and protocol for handling objects with ties to specific families (Sonny McHalsie). In particular, the *sxwayxwey* masks used in the ceremonial winter dancing have strict access protocols tied to the individual families who safeguard them. Whether or not such protocols can be enacted determined whether or not such objects could even be included in a digitization project.

³⁶ <http://www.virtualmuseum.ca/sgc-cms/expositions-exhibitions/danewajich/english/index.html>

The Stó:lō *sxwayxwey* masks and Dane-zaa Dreamer songs provide concrete examples of points of friction from digitizing heritage. Digital platforms built for Western concepts of attribution and rights may be unable to handle information with communal, transient, or indefinable owners, and those that can handle these factors may require more time and know-how than many communities can spare. Such issues might be resolved through community discussion and negotiation, as they have been with the Doig River and Stó:lō virtual exhibits, but these solutions can become an ongoing process and cause friction within the community themselves, as disagreements arise over the best methods to use.

Data Security

Even if a community is able to determine how best to represent heritage digitally, there remains the concern over the security of this information, particularly if it is available online. In addition to concerns not specific to Indigenous communities, such as access by the federal government or illicit hacking (Amber Ridington), spiritual protection is another factor many Nations are concerned with. Information pertaining to sacred objects, practices, and locations may be strictly regulated within the community, and the degree to which this type of knowledge is kept under control is a concern for knowledge keepers. An inherent tension between current technological trends and some Indigenous knowledge protocols is Web 2.0's emphasis on the free and open exchange of information (Morphy 2015). While digital technologies, particularly those with online platforms, offer an attractive option for widespread, inexpensive dissemination, security over sensitive information remains a concern.

The Tsleil-Waututh Nation has looked into the online catalogue option available through PastPerfect as a way of increasing access to their archives, but “the idea of putting [cultural information] on the cloud can make people nervous” (Adrienne Morrison). Brandon Thompson, while in general an advocate for such technology, recognizes the hesitance of many of the nations to use online platforms. The Insight System for the Squamish Nation manages access to information conservatively, only “showing you what you need to see,” with information restricted based on whether the user works in the land referrals department, is a member of the Squamish Nation, or is

an outside proponent or collaborator. The SRRMC does use the Web version of PastPerfect to make their library catalogue accessible remotely, and Tia Halstad finds the system easy to place or remove items from online access. The SRRMC has in general taken advantage of such online platforms as Youtube to reach a wider audience, more so than the other nations studied.

The SRRMC was an enthusiastic adopter of the PastPerfect catalogue for their Library and Archives (Tia Halstad). The catalogue³⁷ allows users to search, preview, and in some cases directly download books, reports, photography, and other documentation in the SRRMC's collection. However, for information held in less publically accessible departments, the Centre is more cautious about what can be shared. David Schaepe affirmed the commitment to make the library collection completely open to the public, but also spoke to the challenge of weighing security and access in the context of protecting sacred sites, which could require divulging sensitive information in a controlled manner. When making information accessible to the public, different levels of openness and granular access controls may be necessary to balance issues of security versus accessibility.

Locally stored digital information can more securely restrict access by controlling the number of individuals with access to the database. The SRRMC and the Tsleil-Waututh Nation have limited staff that can log into the back end of the PastPerfect catalogue (Michelle George; Tia Halstad). PastPerfect has built-in user groups that can control access to different items and functions within the system, though these are based on the hierarchy of museum staff. Neither the SRRMC nor Tsleil-Waututh uses these, however, their operations do not need more granular control among personnel with database access (Tia Halstad; Adrienne Morrison). Access to the information housed in these systems is based on either public or staff-only permissions, rather than a more complex set of permissions based on traditional protocols.

³⁷ <http://stolonation.pastperfectonline.com>

System Access

Archivist Adrienne Morrison see accessibility as a defining aspect of informational institutions, as information that is locked away becomes “obsolete.” Fellow archivist Tia Halstad, shares this viewpoint: “if we don't make it accessible and people can't access it, then it's not very helpful to have it stored away in the back.” This concern also translates to physical objects, that even if not in storage, may be functionally inaccessible if they are stored remotely from their source community. This issue was a major motivation for the Haida Project at the Pitt Rivers Museum as described in Chapter 2, and demonstrates another advantage to digitization through increased accessibility, as was achieved with the Inuvialuit Living History website, or the multi-community repository of the Reciprocal Research Network. Sonny McHalsie is encouraged by the number of images now available that allow individuals to view cultural objects, even if they are unable to view it in person. However, all participants agreed that there is some heritage that cannot be so freely shared.

How such information is accessed was the most commonly cited concern among participants. For several nations, control over the access to sensitive or sacred information was dictated by policies preceding the adoption of any digital databases. The Tsawwassen Nation, which is currently without a management system, has developed a Freedom of Information and Protection of Privacy Act that mandates how information can be accessed by both members and third-parties (Jennifer Jansen). While the Act was written to allow transparency within the nation, some information, particularly with significant cultural or spiritual sensitivities, can be withheld from an information request. One of the major concerns in implementing this Act was access to recorded interviews of elders who had since passed:

The way it was explained to me, was that when they were speaking and giving that information, they were giving away a part of themselves, and it would be a violation of that to release it to the wide world, or to release it to someone external who isn't familiar with that aspect of that recording and who isn't supposed to have access to that information, wouldn't have had access to it from that person or at least not in that framework (Jennifer Jansen).

This particular concern was an issue during the digitization project of these recordings. A member of the Tsawwassen Nation was hired for this project as the Nation

did not want non-members to have access to the recordings at this phase. Even with this measure, it was unknown if she would encounter any information of particular sensitivity. Unable to avoid such an instance entirely, she was instructed not to share what she had heard until the Tsawwassen Chief and Council could determine the proper protocols around the recordings. Even once this was done, “it would likely be inappropriate to make everything available to everybody, even internally. So there has to be a process of identifying what’s appropriate for people to hear and what would require either permissions from the family members, or other ways of giving permission to listen to things, if that’s needed” (Jennifer Jansen). The process of digitization has prompted the Tsawwassen Nation to consider how cultural protocols can be codified, but rather than drafting a complete set of rules, it is addressing the issues as they arise.

Access to the Tsleil-Waututh archives (Michelle George) and to much of the information managed by the SRRMC (Tia Halstad) requires a similar vetting process to Tsawwassen’s information requests through research registries, where a proponent submits their request for consideration. As Halstad explained, “There are some restrictions for confidentiality, for cultural reasons.” Similar to the family-determined protections on the *sxwayxwey* masks, the donors of this information determine many of these restrictions as part of the agreement to make it a part of the SRRMC collection, much as a donor to a museum may stipulate. When sensitive information is shared digitally, David Schaepe offers words of caution:

You do have to be very vigilant of those arrangements and reuse of information in terms of the sharing of digital data, the need to make sure it's destroyed, your certainty in which that's taken care of, a certain degree of trust in all of this, how you verify whether digital information has actually been destroyed in someone's system, other than their saying they have.

While confidentiality agreements, research registries, and memoranda of understanding are useful tools in establishing the acceptable use of information, the security risks carried with digital sharing add to the level of care exercised in making sensitive information available.

The Squamish Nation exercises similar precautions, though much of the information pertaining to sacred locations is kept within the Land Management

Department and rarely shared outside of the department in accordance with the *Xay Temíxw* Land Use Plan (Lisa Wilcox). When required to divulge more specific information, the department exercises discretion in relaying only the most crucial aspects, and requiring third parties to sign a confidentiality form in order to access such information (Brandon Thompson). With existing practices in place, any software that would facilitate access to information needs to accommodate such protocols.

A partnership to oversee shared land between the Squamish Nation, the Tseil-Waututh Nation, and the Musqueam Indian Band brought both opportunity and challenge to Squamish's efforts to implement a land management database. While the Insight Land Management System has great potential for online dissemination, and has the capability of creating a workspace only accessible to the MST Development Corporation, the Squamish Nation needed to balance the accuracy of the spatial information with keeping restricted information locked down (Brandon Thompson). The Nation plans to deploy the program's user group function as a way to maintain granular access to nodes of information, so that members of the corporation can view all the information relevant to its operations without allowing a user to view information that concerns only one Nation.

The methods of adapting software to cultural protocols (or vice versa) varied from case to case, and largely depended on the intended use of the database. The McLeod Lake Indian Band intended their archive to be open to all in the community, with some restrictions as needed. For this, they initially developed three levels of access using Mukurtu's community protocol function: open community access; restriction to protect individual spiritual power; and restriction to protect legal privilege (Amber Ridington). These custom access levels enabled the community to use the database for its archival purpose while accommodating both spiritual and legal privacy. A fourth category, "needs consultation," was added to accommodate information with yet-undetermined access restrictions.

When the Squamish Nation deploys the Insight Land Management System for regular operations, the plan is to have three levels of access linked to the different types of users:

There would be three levels of access to our database. One is our team members which is about six of us who would have complete access to everything. Then there would be a second level of access of some of the more important documents, a summary of what's going on at that location, and maybe larger maps with more detail of what's going on, and that would be for our elected representatives. And then a third one would be a general indication of the title and generally what's going on within that part of our traditional territory, and that would be for our community members, members of the Squamish Nation, and/or a member of the general public that we think would need to get that kind of access" (Bill Williams).

These three levels correspond with the plan to use the system for internal operations as well as a method for controlled dissemination. The SRRMC's house-built land management tool Stó:lō Connect (not covered in this study in favour of the more accessible PastPerfect CMS) has a similar tiered access setup for land referral reviews. Non-members with system access have a limited view of the cultural data housed in the database, while members of the nation may view all cultural data except for areas of spiritual practice, while resource managers of the SRRMC have full access to all of the data (Sue Formosa, personal communication, 2017). These levels serve the purpose of facilitating land referral reviews for the SRRMC effectively, while also safeguarding the most sensitive areas with Stó:lō territory.

As the Insight database continues to grow, Williams hopes that these categories can be further developed to match Squamish protocols, such as adding user groups for specific families to interact with more restricted forms of information, or adding functions for other departments within the nation (Lisa Wilcox). The Insight System allows for such granular control, and "each one of these components, whether it's a map layer or a parcel or anything that you would access...we can lock that down or create permissions for it" (Brandon Thompson). This is a major feature of the system, as the Nation often has to define areas of land that are restricted, but due to protocol cannot disclose the cultural or spiritual significance that makes it off-limits.

The practicalities of software utility can also have the potential to conflict with cultural needs. This was particularly true in determining access to the database. It is often difficult to find personnel who possess both the cultural and technological expertise to operate a content management system while following cultural protocols. The majority

of participants who worked directly with software are employees of a First Nation, but not members. While this never came up as an explicit issue, at least one participant expressed a preference to employ a community member to administer the platform (Bill Williams). Amber Ridington recognized that her role as an outsider would limit her ability to deal with issues of cultural sensitivity. Most of the platforms require at least one administrator with access to all of the information and functionality. Mukurtu is a notable exception, with the ability to remove specific items or categories from even the view of administrators, by creating users with specific permissions over digital heritage and/or protocols. While requiring one user to hold the “master key” may not suit preferences and protocols, “if there's no one managing it, then we might have gaps” (Brandon Thompson). In such a case, the need for a functional database may hinder or prohibit the implementation of cultural protocols.

While many participants acknowledged the challenges of maintaining the integrity of heritage information and the protocols surrounding it in the efforts of digitization, most of the concerns were of immediate practicality. Overall, the challenges faced by these communities were surmountable to the degree that the resulting database serves its intended purpose without breaching heritage management protocols. However, all five nations benefitted from collaborative efforts between community leaders and employees or consultants versed in the technological capabilities of the software in question (or in the Tsawwassen Nation’s case, legal expertise in the drafting of the Freedom of Information and Protection of Privacy Act). Not every Indigenous community has access to such individuals, and thus may struggle more to find or implement content management systems as suitably.

Software Deployment and Use

One of the main questions of this research was how Indigenous communities adapt, or adapt to, premade software to facilitate cultural protocol. As such, the discussion of localization approaches was a significant portion of my interviews, particularly with the participants who worked firsthand with the software. These conversations covered conceptual issues in knowledge framework integration, the

experience of implementing protocol into the platforms in question, and the general experience of using the platform in day-to-day operations.

Framework Integration

The ease with which a community can integrate protocol with technology depends on many factors, but exposure and previous experience with working within (or against) Western frameworks were major ones. Amber Ridington demonstrated this factor by comparing the McLeod Lake Indian Band to the Stó:lō Nation: “There's hundreds of years of Stó:lō experience with non-native culture ...but then the northern people that I've worked with...they hadn't had to mix with Western culture for as long.” David Schaepe agreed with this view, asserting that “we started with a much more Western perspective and have slowly begun to turn it into a more Stó:lō perspective”, and as a result, the SRRMC has been at the forefront of many digital heritage initiatives such as the Reciprocal Research Network.

Ridington and Schaepe both approach the success of framework integration from a top-down perspective, starting with the available technology and adapting it as needed. The PastPerfect CMS, with its existing framework, serves a specific purpose in information management at the SRRMC, and for this purpose the staff have found ways to fit Stó:lō protocols into its use. However, Schaepe also recognizes the advantages to the bottom-up approach, as it gives a community “a much better position to be able to fabricate something along your rules and guidelines and framework and classification systems as an original production that's going to fit your needs and the society much better.” Of the five case studies, the Squamish Nation best reflects a bottom-up approach. Though the Insight Land Management System already exists, Cloverpoint worked to create a custom instance that would meet the nation’s needs and protocols (Lisa Wilcox), an approach that, at least initially, assured Wilcox of the suitability of the software.

Whether using a top-down or bottom-up approach, communities seeking heritage management solutions must consider the extent to which they are willing to incorporate a Western framework into the final iteration of the software. The McLeod Lake Indian Band recognized that there were certain aspects to Western-style information

management that were simply unacceptable. Whether or not a platform was adaptable, “they don't want to be burdened with managing these archives in a Western style,” with one community member labeling the planned project of a digitized catalogue with a fixed schema as “colonialism all over again” (Amber Ridington).

Adrienne Morrison faced similar challenges in bringing her training as an archivist into a First Nations environment, and found commonality in this tension in speaking to staff at the SRRMC. “The gaps between records management and First Nations records management...there's not a lot of standards, there's not a lot of tools out there for First Nations records management.” Morrison had to work around these issues as she encountered them. The “golden ticket” in this process was an article (Caust- Ellenbogen 2013) Morrison found that explained how to optimize PastPerfect for archival use by finding the archival equivalencies for the museum terminology used in the system, though she believes “there even needs to be another article written that optimizes PastPerfect for not just archives but for First Nations archives, because I think that would actually be a really good tool.” However, Morrison also sees this as an opportunity to change perceptions and practices in information management as a whole: “I think it's helping to challenge the perception of archives today, it's helping to challenge what an archive really is and what the purpose of it is, and challenge some of that archival theory a little bit.” Integration does not have to move in a unilateral direction, and both frameworks can benefit from it.

The Stó:lō Nation and McLeod Lake Indian Band found a solution to the gaps in Western frameworks to adequately represent their heritage digitally through external tools. The Traditional Knowledge Labels, discussed in Chapter 2, allowed both communities to find or create attribution labels more appropriate to their cultural protocols. David Schaepe praised the TK Labels as used in the Sq'ewlets virtual exhibit for their ability to differentiate Indigenous knowledge as information that requires special consideration and treatment:

I think that's very helpful...the traditional knowledge labeling, to convey that this is a system of knowledge and an associated worldview that people need to understand is not the same as a Western perspective, which is probably the common assumption going into looking at the structure and arrangement of knowledge in libraries and archives and

elsewhere, that there's a Western system that applies universally, when in fact that's not the case.

Amber Ridington had similar success implementing the TK Labels in the Tsek'hene Community Archive, though the new system built on Trailmark does not innately handle the labels.

Software Function

The longevity of a platform is tied to its suitability for its intended functions. For the SRRMC, the PastPerfect CMS was an ideal solution for their needs as its different modules for objects, archives, library, and oral histories matched the different collections housed by the Centre (Tia Halstad). This integrated system works well for a multi-function operation like the SRRMC, as the data can be stored within one system and cross-referenced within it. Additionally, PastPerfect allows for the creation of custom terminology instead of forcing a defined set of terms, particularly important if a community wishes to use Indigenous terms, as the Stó:lō do.

Language was one particular challenge in software implementation, partly due to the lack of a standard orthography for many First Nations, and in some cases, the software's inability to handle special characters. The SRRMC makes a concerted effort to include Halq'emeylem terms in the subject headings of items in PastPerfect, and found that the software handled characters like colons more easily than the previously used InMagic (Tia Halstad). Other symbols, however, are not supported, though Halstad has suggested to the developers of the software that they add this feature.

The majority of interview participants worked in some capacity in an office environment, and information database software served in some capacity in day-to-day operations. For most, it was an immediate need in the nation's operations that prompted the adoption of a content management system. The Tsek'hene Community Archive was originally needed to assist the band in treaty negotiations (Amber Ridington). Once the records were gathered and organized for this purpose, it was then converted into a cataloguing tool for a community archives.

The Insight Land Management System and PastPerfect CMS were implemented in part to facilitate internal operations within the Squamish Nation and the SRRMC, respectively. The Insight System, as a centralized database, “is to be able to record a database where our other team members could get the core information on what's going on” (Bill Williams) linking internal data with the high volume of referral requests the Nation receives. Tia Halstad demonstrated how the PastPerfect system allows the different departments within the SRRMC to collaborate on data entry and maintenance. Centralized databases such as these tools aid greatly in promoting internal collaboration in a standardized method.

Data Management

Nations that had adopted an information management system to deal with a large volume of paper-based documents had, for the most part, transferred to a born-digital workflow in using their system. This was particularly useful in offices that receive important documents on a daily basis, such as the land referrals submitted to the Squamish Nation (Lisa Wilcox). Jennifer Jansen also puts priority on high traffic information, as “oral histories are not going anywhere, we're not creating volumes of oral histories every day...We don't have that luxury with emails, because it's growing exponentially.” Adrienne Morrison also placed emphasis on getting information into the system first, referring to this philosophy as “product over process.” However, simply having the information in the system with poor or no organization is not much improvement over having unorganized paper documents, as it does not promote ease of access.

Having an efficient workflow in place to make information useable within the CMS was a process the information managers had to work through. The Tsawwassen Nation requires a setup that makes the data available within the office, and retrievable through a search (Jennifer Jansen). This is best achieved through the use of descriptive metadata, a process that can begin even before the data entry phase through the development of a classification system. This increases the standardization of data, though its merits must be balanced against the odds that some heritage information may not fit a predefined schema, particularly one developed for a non-Indigenous context.

The Tsleil-Waututh Nation and the SRRMC rely on keywords in PastPerfect to increase the accessibility of their collections through the search function. The SRRMC has a standardized list of labels to be used in the metadata fields, though these vary among the different departments and collections (Tia Halstad). However, PastPerfect does not have clear fields for all of the keywords Adrienne Morrison envisioned for the Tsleil-Waututh archives. This is in part due to the previously discussed issues of PastPerfect's intended uses, which are not fully supportive of traditional archives. Morrison instead had to devise a custom workflow for tagging the documents uploaded into the database, and this remains in use in the archives.

Metadata, the imbedded fields within digital files that describe them, also serve a role in how information is contextualized and represented, with significant implications for digital heritage. The cultural value of objects of heritage is enmeshed with their significance to particular people, events, activities, and locations, and metadata allows for this more holistic representation. On top of providing fields to enter these data descriptively, metadata schemas can be used in content management systems to explicitly link and group related information. Metadata are "hugely important" (David Schaepe) for the added value it attaches to data, but is "probably overlooked" in settings where there is no designated information manager.

Sustainability

Amber Ridington defines "sustainable" as "changing constantly according to community needs and according to technology as it develops and changes." Balancing community needs and technological capabilities is no small task, and requires the platform manager to be responsive to both the social environment that the software serves within, and changes to landscape of software as a whole. The technological status quo is a constantly shifting environment, and a platform that is reliant on a third-party operating system or script may be considered fragile if it is unable to adapt to updates.

Adding flexibility to database design is a sensible approach to such projects, because as Jennifer Jansen pointed out, "cultural protocols are meant to be a living thing. They're meant to evolve, and be interpreted differently in different contexts." For

most communities, the integration of protocol with digital database is a new, different context that requires some troubleshooting. This is particularly true for the Tsawwassen Nation and other communities that have only recently had to codify protocols, or reconstruct traditions that have been lost due to colonial influence such as residential schools. Having such a malleable system is a great advantage in developing platforms to meet concerns of cultural protocols, and this can be seen in the success of the Reciprocal Research Network, which “provides safety and comfort for individuals to share information confidentially, and hive off pieces” (David Schaepe). Adaptive technology is more likely to meet a wider array of community-specific needs, and software that does not “lock down” data in a specific format allows the potential for future data migration to a different system.

Amber Ridington exercised caution when attempting to customize software beyond its intended use, explaining “if you do a little coding to customize something then every time you get an update of the whole system, it wipes out your customization.” Software that was not designed to be customizable carries a higher risk of instability. Communities that require extensive localization must seek a platform that will handle modifications while remaining useable. In Ridington’s case working with the McLeod Lake Indian Band, she recognized that customization was necessary to handle Tsek’hene protocols, and thus sought open-source solutions intended for adaptations.

Sustainability of a management system depends on the degree to which the software can be continually operated, but also the degree to which the community wishes to continue using it at all. Two case studies in this research, either during or after I conducted my research, did not fully implement or continue to use the platforms in question. While the McLeod Lake Indian Band put many hours of work into setting up Mukurtu for their community archives, the software was ultimately not satisfactory to the community, who migrated their information to another system. For the Squamish Nation, the change in personnel at Cloverpoint changed the dynamic of the relationship, which resulted in a less suitable platform for the Squamish land referrals department. In both cases, incompatibility with community needs and the software design impacted the long-term sustainability of these systems in the contexts for which they were acquired.

Summary

The nations in this study using content management systems illustrate that currently, there is no “perfect” platform for Indigenous heritage management needs. Each community has different requirements for both the utility of the software, and the ways in which the data are managed. Off-the-shelf systems such as PastPerfect that are not intended for source community use may use industry-specific terminology that does not reflect the accessibility hierarchy of a band office. Customized options require much work to create a system from the ground up, as the Squamish did with the help of Cloverpoint. However, there is still promise in looking to these platforms, as well as the constantly evolving software technologies, for long-term heritage management options. Metadata, immensely important in any information management effort, is a versatile and flexible way to describe data, and capable of interlinking information within a database in a manner that reflects the intertwined nature of heritage as a marker of communal identity and expression.

Software capability is also in a state of change in the sense that developers, both proprietary and open-source, are constantly seeking ways to adapt and improve their offerings and provide more stable and usable options for their markets. This is simultaneously a boon and a challenge: not every community has the luxury of continually updating their system to the newest iteration, and indeed, such software may become unusable without upgrading hardware and other aspects of the computer system. However, software that can respond to a community’s changing needs can also be beneficial, and allow heritage to live more dynamically within its database than it would behind glass panels in a museum. The points of consideration that individual communities must make then are whether the potential benefits of digital heritage in its form and use are greater than the potential risks in digitization.

Chapter 7.

Conclusion

This research began with a simple question: what content management systems work for managing Indigenous heritage appropriately? To address this question, I incorporated aspects of archival studies, museology, intellectual property practices, office management, data security measures, and more, as heritage and information management span many industries and disciplines. I introduced the overarching premise of the research in Chapter 1, outlining both the opportunities and potential issues of using digital technology for Indigenous heritage management. I further explored the historical points of friction between Western and Indigenous epistemologies, and how this has continued into the Digital Age in Chapter 2. In the same chapter, I also discussed several projects in which Indigenous communities navigated Western and/or digital frameworks to manage and present heritage information in culturally appropriate ways. In Chapter 3, I examined a number of platforms used for collections management, and assessed how well suited each would be for handling heritage for Indigenous communities, both demonstrating the prospective marketplace awaiting these communities, and introducing some of the platform features which are explored in the subsequent chapters.

I detail my second study for this research in Chapters 4–6. I begin by describing my methodology for selecting and recruiting interview participants, and the design and ethical considerations of the interview process. Chapters 5 and 6 contain the results of the interviews and my thoughts on how these findings speak to the current and potential role of digitization in heritage management, respectively. The participants came from a wide range of backgrounds and worked in different capacities, but all have a vested interest in, and even optimism for, the potential of digital tools in protecting and managing cultural information. Through these interviews I have gained some understanding of how CMS platforms and other systems are currently used in First

Nations contexts, and how the experience of locating and using these systems can better address the needs of Indigenous community users. In this final chapter, I present six recommendations for communities seeking to implement their own heritage management systems, as well as the continuing and potential challenges that lie in intersecting traditional information with digital platforms.

Recommended Strategies

If I have learned anything from this research, it is that making declarations on the optimal approach to heritage management for all Indigenous communities is rarely productive. The needs of individual communities coupled with protocols governing the access to traditional knowledge means that the “perfect” platform will have different functions to reflect unique histories and cultures. However, through analyzing the results of these interviews, I identified six patterns in successful platform implementation that I believe can be synthesized into recommendations for communities developing a digital heritage strategy, as well as for third parties interested in creating suitable software experiences for Indigenous community user groups.

1) Determine the key function of the software.

In all five case studies, each participating nation sought content management software to fill a specific purpose within their operations. The degree to which participants liked the chosen platform depended largely on how closely its design suited its intended purpose in the community (e.g., software developed for archival use worked better in archival contexts). Regardless of whether a community is looking at pre-made software or a custom solution, establishing the overall purpose of its use is critical in ensuring that a suitable option is selected. The PastPerfect platform served the SRRMC well in its role as an online catalogue for its Library and Archives, as it has a mode specifically designed for this purpose. The staff at the Tsleil-Waututh Nation, however, spent considerable effort optimizing the same software for a strictly archival purpose, as this fell outside what the developers intended for the software, even without considering the specifically Indigenous context of this archive. While it is possible to find workarounds to such gaps, as Adrienne Morrison did for the Tsleil-Waututh archives,

doing so may be impractical for some communities. Assessing both the ideal functionality of a platform alongside what is feasible in terms of available software and the ability to tailor to this specific purpose will decrease the chances of acquiring an unsuitable system.

2) Consider the trilemma.

As established in Chapter 3, the balance between a platform's benefits and its drawbacks necessitates the establishment of priorities. All of the participating nations needed to select software that was within budget. However, merely going for the cheapest option may cause issues down the line, either in costing more with the amount of labour required to use a system, or even ending up with a system that is unusable. Open-source software with its often-free acquisition may have great appeal for communities working with small budgets, but the majority of my participants had reservations in putting both time and sensitive information into potentially unstable systems. Not only may such systems end up costing more down the line in terms of labour and upkeep, but risking the security of cultural information is also of great concern. Understanding what resources can be allotted towards the implementation and use of a system, and that system's cost beyond the initial price tag, will help in keeping expectations realistic.

3) Determine what information will be used, and how.

Regardless of whether or not a CMS is intended explicitly for heritage management, the effect of digitization on information, and how it will be used in its digital form should be considered before it is brought into a system. Some aspects of heritage are too sensitive to risk a potential security breach, or cannot translate to digital spaces without losing some aspect of cultural integrity. Digitization has great potential for enhancing the ability to interact with heritage, for adding contextual information through a CMS interface and for allowing remote access. For information that will be digitized, any cultural protocols that require limitations in its accessibility must be made explicit in the database design. Another aspect to consider is how culturally significant and/or sensitive information will be used within the system, and if these interactions may alter how the heritage itself is valued. Digital heritage is still a fairly new medium, and individual communities must determine for themselves whether digitizing and/or

reproducing heritage information has any affect on how it is perceived. If digital reproductions somehow lessen the value of the original expression, either through how it is used or merely by existing, then this can have significant implications for its role as heritage. Determining first if the information in question is heritage, and if and how it will be treated as heritage in a digital form are thus crucial for continual cultural integrity in the Digital Age.

4) Establish a developer-user relationship.

The nature of the relationship between my interview participants and the developers of their software choice, whether proprietary or open-source, had significant bearing on their satisfaction with the user experience. Having the support of the developer to deal with any technical shortcomings and to offer advice can help lessen the learning curve of a new system. At the same time, developers can benefit from users who articulate their needs in a platform, leading to the creation of more optimal software for their user base. These partnerships may be for individual projects between developers and user communities, which may result in highly individualized platforms as with the Insight Land Management System for the Squamish Nation. However, for more widely available, long-term solutions to reach the marketplace, developers must recognize a potential client base in Indigenous communities, and work toward producing more accessible software. The open-source community shows some potential for this with non-profit ventures such as Mukurtu, but these options are limited and not always capable of delivering ground level support for individual user groups. Mid-level proprietary companies such as PastPerfect appear to have the most potential balance between broad availability and individual client relationships – the missing element is a product in this category specifically geared towards Indigenous communities.

5) Develop and document a digitization workflow.

The usability of a database depends on the robustness of the information contained within it. Designing the process in which information is introduced into a content management platform and ensuring that it is repeatable are critical to ensure its ongoing efficacy in an information management capacity. Healthy databases require a systemized method of entering and describing data. There is some adaptability in how data are managed using flexible metadata fields such as keywords. However, reliable

access and retrieval to this information is reliant on some predictable methods (e.g., using a particular orthographic spelling of a Halq'eméylem term). This process is also important in assuring the proper representation of heritage in its digital form. The correct labeling and attribution of heritage, as well as its level of accessibility, should be established in the digitization process so that the data is managed and represented appropriately within the program. This is particularly important when the steps to appropriately digitize heritage differs from general information management practices – if either the software itself, or the employee digitizing a collection is accustomed to an existing set of standards, then these differences must be made explicit. Documenting this workflow is crucial when designing a community database, as it ensures this process is not locked to one personnel member, and can continue if the community no longer employs this individual.

6) Communicate and build networks.

Social influences from fellow Indigenous communities, software developers, and third party proponents were the number one factor in determining how my participants chose their software, and how they rated the user experience. Several participants also expressed a desire to see more formalized modes of communication among First Nations information managers, as well as developers interested in making software in partnership with these communities. Through my participant recruitment efforts I connected with a number of local and global networks that engage with the issues of Indigenous information management, funding digitization efforts and offering training to communities. These include the now-concluded IPinCH Project, Indigitization, ARMA, the Association of Tribal Archives, Libraries, and Museums, and the Sustainable Heritage Network. Nevertheless, most are rooted in academic institutes or professional information management associations. Networks organized and maintained by Indigenous communities allow a less centralized discussion focused on expressing the challenges and needs facing these communities, rather than the more top-down approach many of my participants had experienced. Part of this process involves moving the discussion further away from the sphere of academia. The move towards community-based participatory research in this field, as illustrated by the Haida Project, the Inuvialuit Living History site, and others, is a promising first step in creating environments where community needs dictate the course of such projects. However,

despite the shift from consultation to collaborative models, many of these efforts still take place in an academic “space” where deference may be given towards the academic or other perceived expert (La Salle 2010:413-4). With so much of existing information management practices deriving from decidedly Western institutions, finding a new “space” where Indigenous knowledge keepers are the recognized experts in information management, and the tech-savvy come in as “technicians” who work for the community to translate these protocols into the digital realm.

Overcoming the Digital Divide

Funding has been, and continues to be, a major barrier for many Indigenous communities. A deficit in other kinds of resources, such as manpower and access to training, can also prevent the successful adoption of a CMS platform, particularly when many communities face more fundamental issues such as access to clean water, let alone a reliable Internet connection. However, as digital technologies continue to develop and evolve, and users on a global scale expect more and more from this software, the gap between the digital and the analogue is widening exponentially.

Working to reduce such financial and personnel barriers is key in this through the production of inexpensive software packages and training opportunities. At the same time, reliance on Western tools and conventions can lead to a repeat of the “intricate technologies of rule” (Stoler 2002:87) that dictated that Indigenous knowledge be organized according to Western schemas. Ensuring that Indigenous communities have access to necessary resources without imposing one particular framework for information management is a delicate balancing act, and one that cannot take place without collaboration within and between communities.

With new technologies and new formats for information comes a renegotiation of how to manage and represent heritage. This codifying process is rarely straightforward, especially when trying to incorporate cultural protocols, which are often determined communally. Some communities benefit from the presence of elders and other traditional knowledge holders who can contribute their expertise in this process. However, this is new territory for many communities, and negotiating the process of digitizing heritage

while maintaining traditional protocols may take time and experience to find satisfactory solutions.

Final Thoughts

Through assessing the suitability of different CMS platforms for heritage management, I learned a great deal about the daily operations of First Nations. There is a certain luxury to academic research in speculating on the potentials of such technologies that the majority of my participants cannot afford to partake in. With the high volume of information managed by the archivists, land referral analysts, consultants, and other nation employees, the pressure to pick a software package that functions for an immediate operational need takes precedence over software with the potential to address more conceptual issues of digital heritage, including the potential these tools to preserve heritage information and present it in dynamic and innovative ways. However, this is not to say that such issues are being neglected. Through trial and error, information specialists are learning what aspects of software meet their needs, and what issues are not currently supported in the software environment. In speaking to the technologically minded users of such platforms, I conclude that such adaptations are realistically possible if programmers put the effort into understanding and realizing them. By communicating this feedback to software developers, as well as to like-minded peers working through the same challenges, there is potential for significant change to the currently available software options, making the landscape a friendlier place for communities seeking culturally appropriate solutions. It is my hope that this thesis serves as one such channel.

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Appendix A.

Museum CMS Survey Responses

Museum	Collection Management Software
Cortes Island Museum & Archives Society	InMagic DB Textworks
Cowichan Valley Museum	Microsoft Access
Creston Museum	Microsoft Access
Gabriola Museum	PastPerfect
Jewish Museum & Archives of BC	ICA-AtoM
Kelowna Museums Society	PastPerfect
Kitimat Museum & Archives	InMagic DB Textworks
Langley Centennial Museum	Argus
Mackenzie & District Museum	N/A
Maple Ridge Museum	Microsoft Access
Nanaimo Museum	Microsoft Access
Oliver and District Heritage Society	PastPerfect
Pemberton Museum	Microsoft Excel
Pitt Meadows Museum & Archive	Microsoft Access
Port Coquitlam Heritage and Cultural Society	Microsoft Excel
Port Hardy Museum	Microsoft Excel
Revelstoke Museum & Archives	PastPerfect
Richmond Museums & Heritage	Argus
Vancouver Maritime Museum	Collective Access
Vernon Museum	Microsoft Access

Appendix B.

List of Interviews

Tsleil-Waututh Nation	
April 11 th , 2016	Adrienne Morrison (Records Manager)
May 4 th , 2016	Michelle George (Referrals Analyst)
McLeod Lake Indian Band	
April 14 th , 2016	Amber Ridington (Heritage Consultant)
Stó:lō Research and Resource Management Centre	
May 18 th , 2016	Tia Halstad (Librarian & Archivist)
May 18 th , 2016	David Schaepe (Director & Senior Archaeologist)
May 18 th , 2016	Sonny McHalsie Naxaxalhts'l (Cultural Advisor)
Tsawwassen First Nation	
July 26 th , 2016	Jennifer Jansen (Records Analyst)
Squamish First Nation	
September 19 th , 2016	Brandon Thompson (Developer Liaison)
September 20 th , 2016	Bill Williams (Lead Negotiator)
October 5 th , 2016	Lisa Wilcox (Senior Executive Assistant)