Developing a Digital Collective and Its Application to Cultural Heritage

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1 Introduction

Digital libraries challenge our long-standing models of information publication, distribution, storage and use. No longer bound by space or time, information is now an object of new debates and shifts of territorial boundaries amongst authors, employers, publishers, distributors, lawyers, policy makers and governments. Legal, ethical, organizational and technical challenges abound. Yet it becomes more obvious everyday that digital libraries and their broadest means of distribution, the Internet, are overcoming challenges and providing new ways for people to access, filter, evaluate and use information.

Early digital library activity aimed at replicating a portion of the existing book and journal collections; authors, especially of scientific papers, also began mounting personal reprints. More recently publishers have moved significant backfiles and currently published journals on to the Internet; some organizations have established publications that are solely Internet based. Each of these efforts represents an enormous effort and some level of risk. Each has grown incrementally and directly from past practice.

In order to create and build digital libraries, information technologists developed expertise in database and retrieval systems. Other specialists working in national and international organizations developed standards. Librarians and archivists created organizational principles and best practice, at times derived from the long and rich history of printed materials and artifacts.

But the time has come to ask: if the Internet provides every individual the capacity to both consume and publish information, how will our digital libraries be shaped in the future? How will we organize new forms of digital publication? In fact, John Lienhard (1998), a professor of mechanical engineering and history at the University of Houston, would have us believe that we cannot impose order on the Web at all.

"It [the Web] makes a grand resource, but it's a resource that fits no model of information transmittal we were raised with. Rather it gives us means for flitting about, reading a passage here, seeing an image there-rapidly building a picture in our mind.

And history's story takes shape in a new form. We're used to stories that unfold from the printed page. On the Web, the story builds up like a mosaic. Some tiles are false, but they soon become obvious and we replace them with better tiles. Once we feared the lack of control of knowledge on the Web. Now it's clear that the very intensity of interaction roots out falsity."

Should we consider a broader scope for digital libraries? Can a digital library contain a whole culture? If we believe that culture is "a mass of interplaying stimuli" (World, 1998), might a digital library preserve, celebrate, reflect, and perhaps even stimulate culture's variety and dynamic change?

We believe that the answer is a resounding YES! We've developed a model of a digital collective and applied it to the indigenous people of the United States, specifically to the cultures of Native Americans.

2 Institutions and Change

Society relies on institutions to collect and make available its intellectual capital and cultural record. Libraries collect and organize printed materials; archives acquire documents, images and others non-print materials; museums of all kinds do likewise with art and artifacts, such as practical implements, costumes and other samples from the physical world. Anyone wishing to view these items must seek them out in a specific location. Often, upon arrival, the viewer is confronted with special condition of access or use and an apparently arcane system of access that poses extra barriers to the uninitiated.

Pressed by competition for viewing audience and for-profit 'edutainment' industry, museums and archives are considering new roles. They are shedding the image of simply places where remnants of history rest in some ordered arrangement, occasionally displayed or accessed. Incorporating new technology to provide context and even immersive experiences, some institutions of memory are encouraging visitors to interact with the materials and with each other. Others are also considering how to incorporate Web technology so that casual viewers and serious researchers may browse holdings and access document or artifact images regardless of time and place.

A few institutions have also taken down their walls, extending their exhibits through the use of images and sound to include buildings, equipment and historic sites. In fact, when an historic site is threatened by encroaching development, environmental pollution or decay, people sometimes form associations to preserve and document the place. Ma-

terials deposited at such physical sites are welcomed for their effort but often mean substantial burden for those who try to maintain the small amount of documentary evidence. Frequently the very best material evidence, the recollections of people who used the site or experienced the place first hand over many years, are never collected at all. Those who are not a part of the mainstream in western industrialized nations may find access to the institutions especially problematic. Generally having limited opportunities for travel to the cultural resources of large cities, these people have little interchange with the systems that maintain their cultural record. Most often, sites, traditions and culture itself pass away with no documentation whatsoever.

3 Native American Perspective

Native American, Alaskans and Hawaiians number approximately two million in the United States, members of more than 550 tribes and tribal governments recognized by the federal government. Approximately half of them live on the 53 million acres of reservation land that comprises approximately 2.5 percent of the entire surface area of the U.S. (Casey, 1999). Many will never travel off from the reservation. Certainly few will have the opportunity to travel a great distance or view the Native American materials that are widely distributed in private collections and public museums, in Native controlled or reservation museums and cultural centers, and in non-Native facilities. Few will experience the treasures in the National Museum of the American Indian (Washington, DC and New York, NY), the Heard Museum (Phoenix, AZ), Mashantucket Pequot Museum and Research Center (Mashantucket, CT), Woodland Cultural Centre (Brantford, Ont.) and the Museum of Indian Arts and Culture (Santa Fe, NM) where each provides careful descriptive control, appropriate presentation, and physical security for the materials in their collections. There is little chance, either, that they will see the many Native American materials that are not publicly accessible for lack intellectual access, exhibit space, proper conservation or the like.

Maintaining cultural roots requires strong determination. The pressures to conform to the mainstream culture are enormous, and the odds of success in maintaining tribal identity may make the task appear futile. But human desire and will are strong motivators. Farai Chideya (1999) captures some of this sentiment in the words of Bird Runningwater, who grew up with his father's tribe, the Mescalero Apache, in the mountains of southern New Mexico, and who also came to know the ways of the Cheyenne, his mother's tribe.

"Among the Native people in the United States there's a dedication to remembering who they are: an indigenous person in their own land. They're working to maintain that identity while mastering what's needed to advance in a mainstream context. It's so complicated."

There are also many materials not kept in these institutions that provide important cultural information and have intrinsic value to a community of people. And there are also intangible cultural treasures that cannot be put into a physical space for storage and conservation.

The complex task, and some would argue responsibility, of maintaining, affirming and evolving cultural identity and traditions in the face of severe economic and social pressures is a frequent topic of conferences and publications and the specific mission of some organizations. In recent years with the advent of powerful technological tools for communication, there would seem hope for maintaining richly-diverse communities. As a recent UNESCO (Our, 1996) publication suggests:

"Technological knowledge and expertise creatively adapted to local circumstances can be a powerful and empowering asset. But power does not derive from knowledge and expertise alone: it emerges when both social and technological capabilities are harnessed to create a cultural resource, i.e., when we forge partnerships between the global and the local. Such partnerships work where the innovative impetus is not only economic and technological but also social."

Native Americans know that culture cannot be contained in institutions. Intangible cultural heritage cannot be put into a physical space for storage and conservation. Rather, the traditions, ceremonies, language, tribal living experience, and connection to nature and place are holistic and dynamic. But perhaps with information technology as the facilitator, children, tribal elders and teachers can create a powerful cultural resource that sustains, empowers and evolves far into the future.

How might we work together to develop a model that will accommodate a whole culture and bring it to the people, wherever they are, in a form that permits interaction, addition, sharing, growth and change?

4 Building the Digital Collective

Our challenge is to model a dynamic repository of digitally-formatted materials in textual, visual, and aural sources. For this effort, we propose a 'digital collective'.

We chose the word 'collective' carefully, to signify the bringing together of contributions from many people, places, and institutions. The digital collective begins with individuals who may be geographically widely dispersed but intellectually, historically or spiritually connected. At the collective's core are the digital images, stories, documents, and resources that define culture. Using digital technology, we can bring together representations of this diverse array and contextualize otherwise separate materials. We can make connections among the virtual objects and link their use, their geographic origin, and their role in a specific culture. We can document origins and include common descriptive material, and we can directly engage the viewer. Using digital capture of voice or text, visitors to digital sites can add their own observations about the virtual materials already in the collective. People can share their personal connections to artifacts and places. At the same time, they document their use of language in relating experiences and in describing objects.

We have avoided terming the collective a virtual museum because to many people a virtual museum implies that there is a 'real' museum. We also find the virtual museum label inappropriate because the digital collective is a model that extends well beyond the boundaries of museum definition.

Digital librarians may consider the digital collective a form of 'inside-out' library building. Certainly, our collective model is informed by the research and development of digital library builders. It is equally informed by observing how different people in different communities use the Web. It is a place where people share personal and professional information and where they seek connections and build community. It is the very mosaic of John Lienhard! Our collective seeks to build an application that uses the technology to leverage individual input; the collective's power is in the people's sharing of perspective, recollections, facts and augmentations in the language of their culture.

We hasten to add that we must be careful to understand that not all information can reside in digital collections. Certain rites, rituals and ceremonies, for example, must remain protected by the practitioners; at times direct human interaction is the only appropriate means of communication. For other information it is important to be accessible only during certain seasons, dates, or by certain age groups. We must remain alert to appropriate application of information technology, guided by a sensitivity to cultural norms and a readiness to respect parameters and receive direction from the communities with whom we collaborate.

Our model is especially well adapted to Native Americans because of their growing interest and expertise in digital technology.

As George Baldwin, an Osage and Kaw Indian and professor of sociology at Arkansas' Henderson State University, said: "There is a pan-Indian movement going on now in which a growing number of Indian people are united across tribal lines to work toward a common social and political good for all-and the links are the new communication technologies." (Rayl, 1993) Baldwin helped launch American Indian Telecommunications (AIT), the first nonprofit group dedicated to promoting the grassroots Native American computing movement. Since that time many other Native-owned computing and telecommunications firms and consulting organizations have been established. "A lot of people like to romanticize, hold Indians to that image of weaving blankets for sale by the side of the road, and we're weaving all right, but it's gone beyond blankets to information," Baldwin says.(Rayl)

But Native American, and all world cultural groups, need help in accessing information technology and in applying it productively. There is a special urgency in our developing new models for cultural extension and preservation. As Abdelaziz Abid (1997) wrote: "Recognizing that urgent action was required to stem the disappearance of vast parts of the world's documentary memory, in 1992 UNESCO launched the 'Memory of the World' Programme to protect and promote that heritage. A[n] objective is making this heritage accessible to as many people as possible, using the most appropriate technology, both inside and outside the countries in which it is physically located. Preservation of the documentary heritage and increased access to it complement one another. Access facilitates protection and preservation ensures access. For example, digitized materials can be accessed by many people and demand for access can stimulate preservation work."

Carlston (1998) adds to this in his discussion of the importance of the Internet to cultural minorities and their heritage preservation. "There have been overt efforts through history by people to erase or alter the histories of other peoples, or eliminate the histories of other people. One of the things that I think the Net holds is the promise of an ability to proliferate information beyond local cultural imperialism you can put information beyond the reach of most of any particular culture's enemies." The digital collective is a distributed storage and access model that will serve to preserve information from natural and man-made disasters.

5 Digital Collective Model Overview

There are four main factors that create and influence the Collective Core, which is the heart of the digital collective. Contributors donate Content, which is then added to the Collective Core from which Products are created that are Interacted with and Commented upon by users and contrib-

utors. The team of content specialists, community members, technology and organization professionals provide direction in each of the steps and processes. The digital collective model is shown in Figure 1 as a circular flow-chart and described below in fuller detail.

6 Contributors

Privately and publicly held materials submitted by individuals and institutions will become content for the digital collective. We are accustomed to donors providing objects and provenance information to museums and archives, however curators generally decide how to handle the contributions. In the digital collective, donors and users directly contribute digital objects, descriptions and comments, build exhibits, and design and offer educational programs.

There are many museum and archive websites that explicitly solicit descriptive information from their visitors and potential donors. (See Notes) Some of these solicit the identification of objects of importance; others are primarily a device to engage interest in the archives or museum holdings. Some institutions consider digital surrogates as a way to enable access to privately held materials. For example, Alicia Haber (1997), director of the Uruguayan El Pais' Virtual Museum of Art writes, "One of its essential objectives is to bring together in a virtual space works found in artists' studios and private collections, and which rarely reaches museums, exhibition halls or galleries." The problem associated with dispersed cultural materials is overcome by using an electronic virtual environment. "Visitors have access to paintings, sculptures, drawings and installations that have not been exhibited for many years, are only shown sporadically, or often are totally unknown." Through the digital collective, contributors can contribute objects they do not want to part with physically but want to share digitally with others.

7 Content

Among the materials that will be donated into the collective will be cultural objects, still images, moving images, sound recordings, voice recordings (such as oral histories), and textual items. The collective does not maintain a physical collection. Rather, the collective will consist of digital surrogates of objects donated by individuals and institutions. As appropriate, physical items will be digitally recorded or captured and returned to the owner; digital objects may be donated directly. Contributors will also assign their copyright permissions to the collective. When necessary and appropriate, access restrictions may be placed on materials in the collective. If provided at the time of donation, the collective will provide information about physical storage locations for the materials. As a general policy, the collective will not store physical materials; however, in practice, some visual and sound materials for which no digital standard exists may be stored temporarily until long term digital preservation is possible.

The collective's diverse digital objects must be linked to appropriate structural metadata or associated in a logical way. Because the content and the descriptive material in the digital collective will be gathered by the team and by users, natural and controlled vocabularies will co-exist. In fact, there is no single language for the collective, although there will be some standard vocabulary for description and access. Multi-lingual descriptive and content materials will

better represent the original materials; ultimately, multi-lingual contributions may document changes in language and in cultural uses of objects.

8 Collective Core

The collective core is where everything resides. Into the core go the digital materials and descriptions, comments and additional information; from the core users may interact with the materials, descriptions, comments and products. The collective serves both as a preservation repository as well as a dynamic and interactive database of cultural materials.

Materials traditionally separated by institutional or cultural boundaries can be linked in the collective's database. In addition, contextual information can be added in the collective. For example, there are many objects in museums that are documentary in nature; this information is not usually described or displayed with the object. Similarly, there are many objects in archives that have artifactual as well as informational value, however the object may not be fully described to museum standards. The digital collective links objects with informational materials in various formats. This enhances the contextual description of the objects and encourages ongoing contributions.

A registrar will maintain the collective's database files, applying appropriate metadata; the metadata will include the terminology of the community or persons who donated the material. All descriptive information and associated materials may be in languages of the donor's choice and ability. The collective will be multi-lingual in both the materials and their descriptions.

9 Products

The Internet is integral to the collective. Since the Internet is based upon distributed input in digital form, it permits both production and consumption of information; it makes possible a model for organizing and sharing images, sound files, and other materials from a number of different sources. However, the Internet and the World Wide Web need not be the only distribution point for the digital collective. Its multiple input sources and collections are not bound by specific location or particular time. Rather, its materials may be viewed and manipulated in a number of formats and technologies including CD-ROM, CAVE Automatic Virtual Environment, or holography and may be stored or transmitted without regard to file size. In order to provide broad access, products will be created from the materials in the collective. These products may include, for example, a website, CD-ROM, or a digital exhibit within a traditional gallery space.

Non-Web products derived from the collective, such as CD-ROMs and videos, will also be available for locations where non-networked systems are more appropriate. Larson (1998) describes several such applications among Alaskan native communities. The School of Information at University of Michigan has produced a CD-ROM (Living, 1999) celebrating the cultural heritage of the Yup'ik Eskimos who live along the West coast of Alaska. The CD includes images from a traveling exhibit of Yup'ik masks created by the National Museum of the American Indian in New York and a series of stories from elders, songs and dances, and school lessons. The CD-ROM links to the Web for access to additional information and materials.

Increasingly on reservations, computer technology is used to record and teach native languages, tribal history and cul-ture, as well as disseminate current information. "With computers, we now have the capability for the first time to have really portable and low-cost technology to be able to enhance cultures," says Jim May, a member of the Keetoowah tribe of the Cherokee and Vice Provost for Information Resources at California State University in Chico. "We can use camcorders to get oral histories and desktop publishing to disseminate information, and I can even print things out in Cherokee now on my Macintosh. It's going to result in an explosion of home-grown materials." (Rayl)

As Abid points out, it is important to "develop products and make them available for wide distribution, while ensuring that the originals are maintained in the best possible conditions of conservation and security. High quality text, sound and image banks could be compiled and made available on local and global networks and reproductions could be derived in all sorts of forms such as compact discs, albums, books, postcards, microfilms, etc."

The collective might also have exhibits or viewing rooms where materials from the collective would display in apparently physical form. Models might also be fabricated using tools that generate physical parts from digitized objects. As an example, John Kappelman, an anthropologist at the University of Texas at Austin, clones an artifact such as a prehistoric skull using a laser scanner and a computer topography system. Then he downloads the data into a rapid-prototyping, three-dimensional modeling station. His work recently permitted the repatriation of Native American remains for appropriate burial while assuring scholars a replica that enables further study. (Tyson, 1994)

The collective may host special exhibits, talking circles, open or closed conferences, repositories of lesson plans, and events and activities suggested by the communities that access the collective. The collective, because it is digital, will also take advantage of rapidly evolving technology for sharing and using information, frozen neither in time nor in place. Immersive environments, collaborative tools and integrated media will encourage a broad range of input from oral storytelling to multi-sensory productions.

10 Interactions and Comments

Users of the digital collective will search, view and organize the collective content through the Web interface. Multiple views will allow school children, for example, to enter the collective at an intellectual and experiential level appropriate to their age and other culturally sensitive parameters. Teachers may draw together special exhibits for classroom use; researchers will make examinations and carry out scholarship that is difficult or impossible in the physical world. Personal paths through the materials may be stored for future reference. At times these individual views of selected materials in the collective may be shared with others. Such digital reference frames will provide rich markers of individual taste and may show new ways of thinking about the resources in the collective. Users may also elect to receive notification of new additions in their area of interest.

Through wide access via the Internet, it is also possible to solicit additional content and contextual information for the digital collective. At times, users will be experts in adding to the record of particular items in the collective. For example, an elder may share a recollection of a particular day when an object in the collective was created; a child may add a sketch of a plant from which a native dye is made; and a shepherd may describe a technique of shearing sheep for wool that will be dyed and woven. Often, people will provide valuable

information that goes far beyond the curators' knowledge. This additional material, reviewed by a curator, may become part of the collective. In this way people are drawn to the collective as well as engaged in their ownership of it.

11 Direction

A team of content specialists, community members, technology and organization professionals directs the digital collective. Their responsibilities include setting the scope and organization of the database, soliciting materials and applying appropriate collection guidelines for accepting content. Their work is informed by the best practice from oral history and anthropology as well as archival and library collection development. The team also oversees registration of artifacts, creation of exhibits and displays, design of educational programming and products, maintenance of electronic records and digital surrogates, and the organization and management of the archival materials.

The digital collective project recognizes that accessibility and longevity depend on compliance with emerging standards for networked information. There are many projects underway that are formulating and promoting descriptive, digitization and format standards. They include UNESCO's Memory of the World programme and their World Heritage programme, the Canadian Heritage Information Network (CHIN) [http://www.chin.gc.ca/], the Scottish Cultural Resources Access Network (SCRAN) [http://www.scran.ac.uk/], ICOM's Handbook of Standards for documenting collections, especially the pan-African AFRICOM [http://nic.icom.org/afridoc], and Central Asia's HeritageNet. The National Library of the Czech Republic has also contributed standards and guidelines for digitizing rare library materials (Knoll, 1998).

Conclusion 1

In developing the model of the digital collective, we have devised a system for gathering content while connecting it to a people and its culture. It provides a living place of both thought and retrospective knowledge sharing. We have met the criteria Carlston (1998) describes as "an evolutionary approach toward the content that allows people to add to it, to understand it, to interpret it locally so that you have a process that stays with it–that becomes a part of that historical record over time."

Documenting culture and passing along best knowledge is one of humankind's most important responsibilities. "We have seen repeated instances where human cultures have suffered severely from a failure to acquire or preserve knowledge at a farther reach. Chinese emperors who burned their navies to prevent the inflow of external ideas saw their societies suffer in the long run as a result. The loss by various human societies of their hard-acquired special knowledge, from Damascus steel to Mayan astronomy, arguably factored in their failure to recoup their previous vibrancy and strength." (Carlston).

Ultimately, the effort to facilitate the building of a Native American digital collective may enhance life of us all.

"While every tribe has its own language and customs, certain values unify all tribes, such as belief in the earth as a living spirit, the harmony of creation and sharing, and the physical and spiritual inner balance of oneself. American Indians and non-Indians alike are now viewing these values as critical to everyone's survival. "There used to be a saying
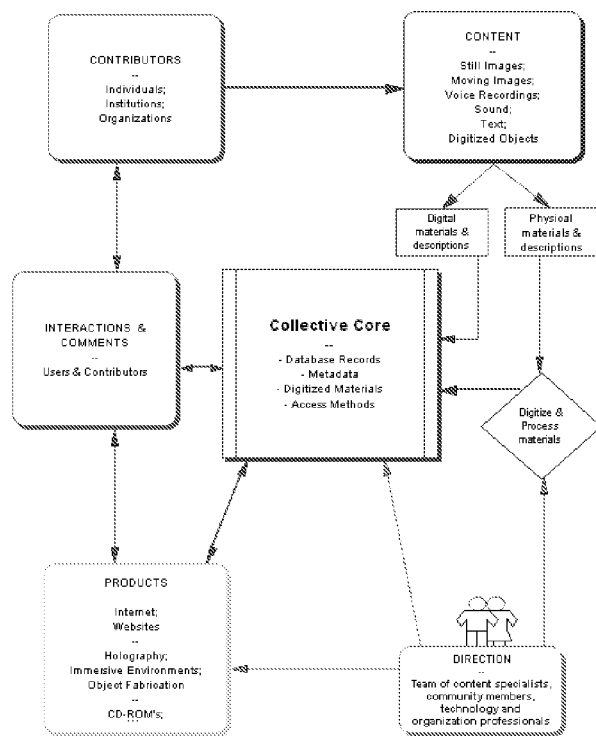

Fig. 1: Digital Collective

in the 1800s: 'Forget the blanket and learn the White Man's ways,"' says John Castillo, an Apache. "Now our elders are saying, 'Go and learn in the White man's world, but do not forget your Indian ways."' (Rayl)

This sentiment was expressed in a more global context by Kenneth Keniston (1999), MIT social scientist, who reminds us that we must maintain our global perspective:

"The experience of India to date affirms the possibility of preserving multiple cultural patterns, and it raises doubts that all values can be neatly classified as American values, Indian values, Asian values, or what have you. Indeed I myself believe that such values as the dignity of human life, the right to a decent living, the right to choose one's rulers, to education, to literacy, to freedom of speech, the press and religion –that these values are not American, Islamic, Asian, or Indian, but simply human."

12 For The Future

If the digital collective offers promise for the preservation of cultural and human values, we must be prepared to answer the difficult questions of all: can digital collectives endure? Can we preserve something of the world's culture for reviewing several millennia hence?

When the mean lifetime of a Web page is about 70 days and there is as much material generated on the Web about every eight minutes as there is in the whole of the United States National Archives (300 gigabytes), we face considerable challenge. Fortunately, national and international initiatives are underway to consider the difficult problems of data loss, digital migration and preservation. And the Long Now Foundation (1999), founded by Stewart Brand

and Daniel Hillis, wrestles with becoming "the seed of a very long term cultural institution". It focuses attention on creating a perspective that transcends the short gain and immediate, perceived 'win'. Brand and Hillis began consideration of the building a device that might last for 10,000 year, most likely a clock. They've now broadened their scope to consider libraries, which are probably humankind's most enduring institution. Brand (1999) says, "We are not the culmination of history, and we are not start-over revolutionaries; we are in the middle of civilization's story.... We don't know what's coming. We do know we're in it together."

Ultimately Brand, Hillis and the rest of us will likely understand that the work we do depends on our success in building digital libraries. For it is the digital library builders who will assure that all the world's citizens have access to their language and culture. Together we can construct that collective place that reaches deep into our past and stretches to the endless future.

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13 Notes (All sites accessed on July 24, 1999)

The USC Interactive Art Museum (http://digimuse.usc.edu/maiden/mystery.html) at the Fisher Gallery has multiple ways of engaging visitors with their collections. They have an interesting example visitor donated information. The gallery has a web page dedicated to locating provenance information about a sculpture in their collection, Ernst Wenck's Trinkendes Mädchen. The South Carolina Library (http://www.sc.edu /library/uscs/newslt97/bethart.html) published and posted some mystery images in the "friends" society newsletter in Spring 1997. "People enjoy the challenge and solve the mysteries. Solutions were published in the next issue and posted to the web site." Stanford Archive of Recorded Sound (http://www-sul.stanford.edu/depts/ars/beyond.html) posts on their website a query regarding an unknown disc. Not only do they have images of the disc but also a sound clip to listen to the music on the disc. The Clements Library in Ann Arbor at University of Michigan (http://www.clements.umich.edu/Photos/Contest.html) posts images from their photographic collections that are unidentified.

University of Michigan School of Information. (1998, 1999). Cultural Heritage Preservation Institute. 1998, 1999 (http://www.si.umich.edu/CHPI/) documents work by Navajo and Ojibwe tribes. The Cultural Heritage Initiative for Cultural Outreach (1996, 1997, 1998, 1999) (http://www.si.umich.edu/CHICO/) displays a wide variety of projects in digital format produced by community members and School of Information graduate students.

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