Native Language Preservation
A Reference Guide
for Establishing Archives and Repositories

Chapter 3: What Is a Language Repository?

LANGUAGE REPOSITORIES: OPTIONS AND CONSIDERATIONS

If a Native nation, community or organization wishes to explore options for building a language repository or becoming part of a language repository system, the first thing to know is that there are two major types of language repositories: 1) an electronic repository and 2) a physical repository. Both types of repositories are detailed in this Chapter. A glossary of terms used for each type of repository can be found in Appendix A, Glossary of Terms.

A physical repository may or may not contain electronic repository features and there is, of course, some physicality to an electronic repository. It is likely that most of the existing physical repositories and nearly all the new ones soon will house an electronic repository, will contain electronic repository features or will join an electronic repository system.

It should be noted that any exploration of a language repository begins with a discussion of what needs to be archived and what should be archived.

A coalition of tribes or language communities may wish to combine efforts and resources, in order to preserve unique, original or other materials, and consider building a physical repository. Exploration of this option would begin with the same question: what is to be archived?

The NMAI Project Team and Advisory Work Group (AWG) agree that the federal government should fund the startup and operation of Native languages repositories.

The Project Team and AWG also agree that the federal government should set up a national electronic repository and that it should contain only those materials which Native nations or coalitions of language communities permit to be included.

AWG Members reviewing this Chapter think that materials in a national electronic repository should be copied with equipment that creates both electronic and archival film copies, and that each participating tribe or community should get electronic and film copies of their materials.

Project Team Members reviewing this Chapter do not think that it is necessary for a language program to have a physical copy of every paper, book, recording, film or other item. The priority need is access to the information inside the item. If the information were digitized, it could be even more useful than the physical item.

AWG Members and Project Team Members want the reader to be aware that electronic subject indexes reflect the cultural biases of the indexers, just as subject indexes do in physical repositories, and that the way in which material is searched for and organized affects the time, cost, effectiveness and every aspect of electronic repositories.

AWG Members reviewing this Chapter favor making materials available in searchable text, or a word/phrase index, rather than a subject index. Project Team Members caution that a word/phrase index has its own limitations (it cannot search out film, for example). The reader should be aware that there is great competition at this time to develop more effective search technology. Among the most promising on the immediate horizon is for contextual searches, rather than word/phrase or subject indexes.

The Project Team and AWG are in agreement that there should be a two-part repository system, both physical and electronic, and that the federal government should assist Native nations and language communities in whatever repository option they choose.

A language repository, no matter what type, has two main goals. The first is to create a documentary record of a language as it exists at a certain period of time. The second is to provide supplementary materials for efforts to revitalize and renew endangered languages.

In pursuing these goals a repository can be created with a high degree of sophistication or can be much simpler in its design. A highly professional repository would contain the following elements:

1. Extensive, innovative language documentation that includes the creation of written and sound archives of Native American languages, thereby preserving for the future as much material as possible in a variety of formats;
2. Use of those documentary records as the basis for creating an array of teaching materials that will help preserve and revitalize these languages;
3. Use of the latest technology to create and provide access to both documentary records and teaching materials; and
4. A multidisciplinary capability for the creation of teaching materials that combine methods and insights from linguistics, anthropology, psychology, and education to produce the most effective learning tools possible.[i]

A simpler repository put together at the local level by a Language Preservation office could use any one or combination of the following materials and approaches based upon local expertise and funding:

- Audio Tapes, especially of fluent speakers relating history and philosophy, telling stories, providing cultural knowledge or teaching;
- Video, especially of fluent speakers doing any of the above and illustrating differences in the uses of language, language protocols and gestures and silences as speech;
- Written Materials, including books, articles, essays, descriptive materials and annotations;
- Linguistic Research and Notes, contemporary or historical;
- Description and Identification of significant language revitalization/preservation efforts;
- Materials that document how other peoples around the world with endangered languages have been revitalizing and preserving their languages and developing educational curricula;
- Technology Resources, including a distributed database, metadatabase and searchable sound, text, graphics and animation files, and an Asynchronous/Synchronous Learning Environment;
- Resource Lists of people, collections and materials that can provide information, expertise or knowledge about the language from a story-telling, oral presentation, linguistic, anthropological, historical, psychological or educational context;
- Descriptions of model language revitalization and education programs from around the United States and world that have had significant success;
- Materials that describe how repositories can be effectively used in language revitalization and education programs.

ELECTRONIC LANGUAGE REPOSITORIES

One tool for helping save Native American languages in the contemporary world is an electronic repository. In the days before the Internet came into being, a repository was considered a facility where items (e.g., artifacts, manuscripts, recordings, films, etc.) were deposited for storage and/or safekeeping. These items were typically carefully cataloged. Then scholars or others would fetch the object for some purpose important to preservation or their scholarship, work, or avocation.

What is an Electronic Language Repository?

Like a physical repository, an electronic repository is a storage place. What is stored electronically, usually on a computer or placed on the Internet, are documents, recordings, films, information, photographs, data, data about data and other items that can be cataloged and accessed for some purpose important to preservation, scholarship, work or avocation. Sometimes electronic repositories are also called virtual, or electronic, libraries.

An electronic language repository is designed to preserve a record of endangered languages, provide resources for language research for language scholars, or to act as a repository of information, knowledge and wisdom that can be accessed by those wanting to learn about, or learn how to speak or

read, a language. In the most sophisticated design, electronic repositories allow teachers to use repository items as an active part of their curriculum design.

Such repositories can be simply designed. They can just be links on an Internet page that lead to written documents, such as dictionaries or scholarly work by linguists or historical documents. Or they can be enormously complex, using tools like the Dublin Core, Internet-enabled databases and even meta-databases.[ii]

Lenape Language Project

A single paper cannot pretend to explore the depth of the electronic laboratory work going on around the world. At its most basic level, a single Native nation or language community will decide to develop an electronic repository to help with its efforts to save its language. An example of this basic kind of effort is the Lenape Language Project.

In this project, the Delaware Tribe has developed Compact Disc (CD) recordings designed as an introduction to Delaware. "On the CD each word is pronounced by a Native Lenape speaker and is illustrated by a photograph. There are three different modules, each with words in seven categories: Animals, Birds, Counting, Foods, Kinship Terms, Objects, and Phrases. The words are on two levels of difficulty." A guide to spelling and pronunciation is included.

The Project has three types of modules designed to help develop an understanding of the language as spoken by Native speakers:

1. A SLIDE SHOW, which presents words and images one after the other, in random sequence. This is the best place to begin to view the photos and to learn the words.
2. FIND IT, where images are presented in sets of three or four and you hear and see a single word. You must find the correct image to go with the word. If you pick the wrong image, the word will repeat later in the sequence.
3. The MATCHING GAME, which selects ten images at random and randomly scatters them on the screen. You must find both of the two matching images. When you click on the second of the matching images, both will stay on the screen. You continue until all ten images are displayed. As each image is clicked, the word is spoken and displayed.[iii]

Developed with grant funds, this basic kind of repository is designed to preserve the Delaware Language by having Native speakers develop lessons for beginning speakers. Normally, a number of aids are included in efforts of this type, such as the spelling and pronunciation guide included with the Lenape CD.

Ulukau, Language Revitalization for Hawaiians

Selection of the kind of repository built is based on the group's goals for the repository. For instance, Ulukau,[iv] one of the most important repositories concerning an Indigenous language, is designed "to provide accessibility to materials and improve educational resources and language revitalization for the Hawaiian and larger communities."[v] It is a digitization project that selects materials from the enormous Hawaiian Archives, uses scanners to digitize documents and then places those documents into an Internet site that Hawaiians interested in their language and culture can access from anywhere in the world. This is a straightforward project with a design that is easy to put into place, even though any number of complexities are related to selecting material, scanning it, photographing it or putting it into an appropriate format, and then making sure it is put onto the website so that it is readable and looks professional.

American Indian Studies Research Institute

The American Indian Studies Research Institute (AISRI) at Indiana University is "an interdisciplinary research center for projects focusing on the Native peoples of the Americas." "Current projects center

around Plains Indian languages, cultures, and history, and include software development that enhances linguistic documentation, analysis, and publication, as well as innovative instructional media for teaching Native American languages."[vi] Included in the repository online are interrelated topical areas:

- Language Documentation
- Culture History
- Music Documentation
- Material Culture

Material on each of these areas is available for five languages:

- Pawnee and Arikara, both northern Caddoan languages;
- Yanktonai and Assiniboine, both Siouan languages;
- Passamaquoddy, an Algonquian language.

Additional work is currently underway on Haida, a language isolate; Thompson, a Salishan language; and Kaska, an Athabascan language. These are Alaskan and/or Canadian Native languages.

The project's dictionary portal is designed "to support standard textual linguistic material as well as sound, data, graphic images, and video clips." A multimedia dictionary database program developed at the college, the portal has the following characteristics:

- It structures data in one-to-many relationships, in contrast to the standard flat-file format of most databases used by linguists.
- It provides sound recordings. This innovative feature allows sound recordings of Native speakers pronouncing entry forms as well as grammatical forms and examples of words in phrases and sentences. The recordings supplement the written record by providing a comprehensive oral record of the lexicon, as well.
- It allows graphical images and video clips. This feature provides for illustrations of entries that are critical for clarifying cultural objects and actions for which there are no standard English translations.
- It is designed so that the user can export the database to any one of a number of specially formatted output files, enabling the user to provide the data in HTML/world-wide-web format, WordPerfect format or standard ASCII format. Thus, the dictionary database can be readily published, both as a professionally formatted printed version and as a state-of-the-art professionally formatted electronic version.[vii]

Another tool available is an annotated text processor "designed to manage interlinear text and to support the operations of several kinds of linguistic analysis including parsing[viii] and glossing."[ix]

> Interlinear text analysis is a fundamental form of linguistic calculus in which a text is organized word by word and aligned into blocks with glosses or morphemic analyses listed across several lines….the first line contains the phonemic words, the second parses the phonemic words into sequences of morphemes, the third gives the gloss of each constituent morpheme, and the fourth line provides a literal gloss of the phoneme with which it's aligned.[x]

This only begins to describe the technical nature of the work at Indiana, but may help the reader understand how complex and sophisticated a repository can become.

The last element in the AISRI work on American Indian languages is its Center for the Documentation of Endangered Languages (CDEL) Sound lab. Using digital sound recording technology, CDEL is designed "to preserve audiovisual materials, to enhance the quality of older analog recordings, and to enrich multimedia educational resources." The laboratory's instrumentation allows the lab

- To create and store sound files as well as import them into multimedia programs;
- To establish a sound archive where recordings are stored for users in the future; and

- To use computer software programs to enhance the sound quality of older analog recordings made on wax cylinders and tapes, so that this material can be used for linguistic study and can be incorporated into dictionary databases and multimedia lessons.[xi]

National Museum of the American Indian and Queensland University's Indigenous Knowledge Management System

An even more ambitious project has been developed by Jane Sledge, in charge of Information Technology for the National Museum of the American Indian (NMAI), and Jane Hunter and graduate students, notably Bevan Koopman, at the Distributed Systems Technology Center (DSTC) affiliated with the University of Queensland in Australia. The American Indian Higher Education Consortium (AIHEC) and the World Indigenous Nations Higher Education Consortium (WINHEC) have also participated in aspects of the Indigenous Knowledge Management System (IKMS) project. This massive effort is also paired with a major metadata repository effort being undertaken in partnership with other museums by NMAI.

The IKMS project was started to allow Indigenous groups to use multimedia technologies to "record and preserve significant aspects of their cultures, including languages[xii], ceremonies, dances, songs, stories, symbols, design, artwork, tools, costumes, historical photographs, film, videos, and audio tapes." Among the project's goals is an effort to develop an electronic mechanism to enable traditional owners "to define and control the rights and access to their resources, in order to: uphold traditional laws; prevent misuse of Indigenous heritage in culturally inappropriate or insensitive ways; and receive proper compensation for their cultural and intellectual property." Developers also believe "it is essential that Indigenous communities are able to describe and contextualize their culturally and historically significant collections, in their own words and from their own perspectives."[xiii]

The software was designed for use by any community willing to work with NMAI and the DSTC to develop expertise necessary to implement the software in their community. The idea was to develop a distributed database of multimedia items that could be held by the community on their servers for the community's purposes and shared outward only when the community deemed such sharing desirable and appropriate. A distributed database "is a database in which portions of the database are stored on multiple computers within a network. Users have access to the portion of the database at their location so that they can access the data relevant to their tasks without interfering with the work of others."[xiv]

Some of the most important design characteristics built into the IKMS software follow:

- Security mechanisms - because of the sacred/secret nature of the content with which we are dealing, it is essential that the IT security mechanisms which are employed are impenetrable and reliable;
- Simple user interfaces - many of the potential users of this system will have low computer literacy, so simple. intuitive. user-friendly interfaces are essential;
- Robustness - the system must be able to stand up to the rigors of unexpected input by users with little prior computing experience;
- Low cost - in order to make the software open source and accessible to indigenous and grassroots communities, it must be built as inexpensively as possible, using tools which are ideally free;
- Interoperability - the software tools should be built on international standards - Dublin Core [11], CIDOC CRM [12], MPEG-21 [7], XrML [8]- in order to ensure maximum interoperability between disparate databases;
- Portability - it should be able to run on a range of platforms and operating systems. Java (JDBC, JSP), XML and SMIL were used as the software development environment to ensure transparent portability across platforms;
- Flexibility - The customary laws and intellectual property needs of traditional knowledge holders vary enormously among Indigenous communities throughout the world. Quite

often the views within a single clan can vary significantly, and they may also vary over time. Our system attempts to support the common notions associated with traditional laws within Indigenous communities. In addition, we provided Schema editing tools to offer maximum flexibility and to enable easy customization of the software; and.

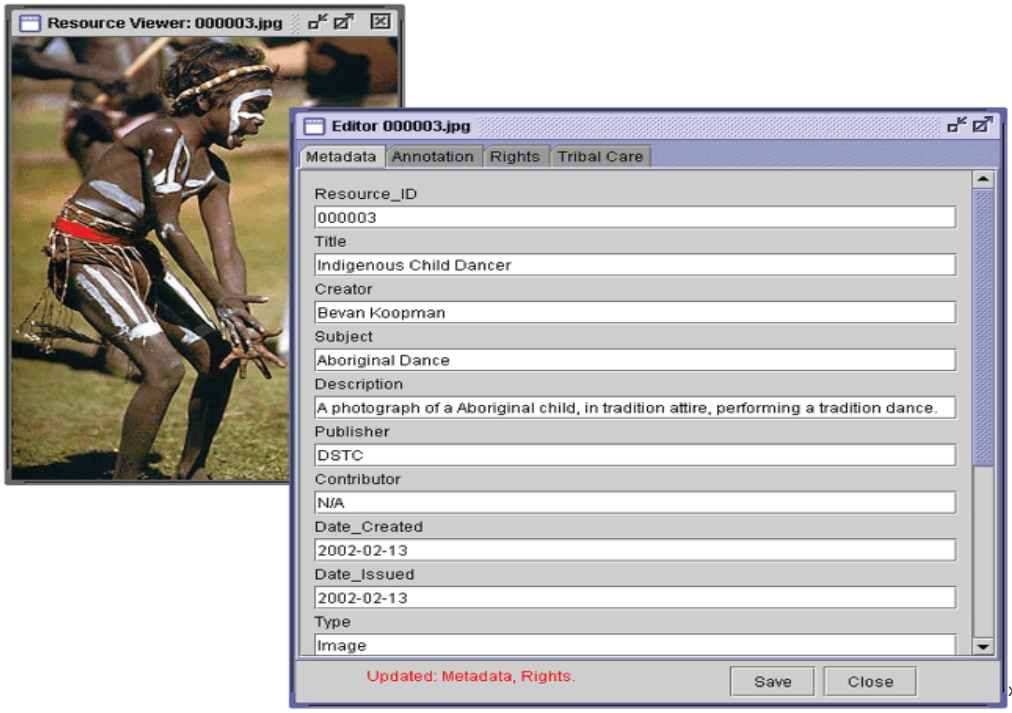
- Scalability - the size of Indigenous collections (particularly within cultural institutions) can reach hundreds of thousands of objects and historical references. The software should be capable of efficiently enabling metadata/constraints to be applied across large sets of resources, individual resources or regions/segments within resources for either individual users or user-groups.[xv]

Member colleges and universities from AIHEC and WINHEC are involved in the project as beta testing sites for the software. At Little Priest Tribal College in Nebraska, for instance, a three dimensional tour of the Ho Chunk Society Historical Museum located on the campus is being developed. Working with experts from NMAI, middle school students from the community's schools are taking photographs of the local museum's artifacts and displays. They are also meeting with elders and historical society members as part of the effort to develop annotations for each object included in their tour. Local objects will be supplemented in the virtual museum by working with NMAI in Washington, D.C., to photograph Ho Chunk cultural material stored at NMAI's Cultural Resource Center in Suitland, Maryland.

This work will eventually be put into the IKMS software on the college's web site. The plan is to have annotations in both Ho Chunk and English, along with digitization of collections of documents, oral histories and films collected by the college over the years. Language collections will be emphasized in these efforts. Those leading the Little Priest effort hope to work with linguists, as well as tribal elders, as they develop their project.

A similar effort is being undertaken at Turtle Mountain Community College in North Dakota, the *wanagna* (post-secondary tertiary institutions of higher learning) in New Zealand's Maori communities and in one Australian Aboriginal community, the Nunnacal. Each community defines a different project with different approaches and techniques.

A screen shot from the software should help explain at least part of what the software accomplishes. Please note the "annotation," "rights," and "tribal care" sub-menus, as well as the metadata information.



[xvi]

NMAI's Metadata Effort

Another project of note is the effort to create a metadata repository at NMAI designed to link databases containing American Indian, Alaskan Native, Native Hawaiian and South and Central American Native art and cultural items from around the world. This is still a forming effort, but when it is done it will allow Indigenous people to explore music or oral recordings, as an example, in the collections of museums, archives and repositories that are online around the world.

Robert Peacock, former Chairman of the Fond du Lac Band of Ojibwa Indians in Minnesota and now the President of White Earth Tribal and Community College, used to dream that he could go over to the Band's small museum and use computers to explore Anishinaabe art, cultural items and information available from Canada, Europe or wherever it might be found. This project could make that kind of power available to local Native people. Recordings of Native speakers collected at the dawn of voice recording capabilities could become easily accessible and usable for language scholars and students. Photographs, documents, information and videos could also become available. This kind of electronic repatriation is not as important as repatriation of objects and items of value to Native nations that should be in possession of them, but it could still be valuable as part of an overall electronic repository effort designed by individual Native nations or groups within them.

Education and Scholarship

Normally electronic repositories are aimed at serving the needs of those who want to learn about a particular language for either education or scholarship purposes. Often a repository is designed to meet both needs. Those who build electronic repositories can design them so that oral histories, storytelling, examples of language usage, descriptions of objects or other uses of language are stored in a way that makes them useful to either beginning or more advanced learners of Native languages. In some cases, such as the Lenape Language Project, a CD is designed to meet the needs of a specific group of learners. Examples of Native people speaking their language are designed to help learners practice and master specific language skills.

Repositories for scholars are often organized differently. Instead of presenting material in sequences designed to aid the learning process, modifications are used to present information consistent with the Dublin Core, or perhaps another schema standard. Some repositories use older library cataloging designs, such as the Library of Congress or Dewey Decimal system. Often such repositories are based upon physical repositories that have been in existence for awhile. A good example of this is the Ulukau Project in Hawaii.

A smaller number of repositories are designed with linguistic principles embedded in them. This is certainly true of the University of Indiana's American Indian Studies Research Institute's repository. The Internet, with its multimedia capabilities and flexible data entry structuring capability, is particularly suited for such designs and provides a special bonus to scholars who have a strong linguistic background. Sites like these are especially useful for languages almost guaranteed to go through a period without living speakers in the near future. Scholars can later study these languages at length and, if enough tribal people become interested, such sites can provide enough linguistic information to revive the language.

Work such as that being done by NMAI lends itself to building sophisticated community-based tools. A sophisticated asynchronous learning environment for teaching about culture and language can easily be constructed using the IKMS software as a kind of electronic information source. Cultural objects or stories or other entrees into the system can be used as learning objects with which teachers can construct sophisticated community-based lessons. The system is purposely designed to meet both educational and scholarship needs of a local, regional, national or international audience, depending on choices made by a local community.

Most of the examples given also integrate cultural preservation into their repository design. Language is the heart of a culture. Most of these efforts recognize that statement's importance.

Reasons for Creating an Electronic Language Repository

The first point to make is that an electronic language repository and related educational programs are not strong enough, by themselves, to either save or revitalize a dying language. As Joshua Fishman, the most important scholar of the emerging field of revitalizing languages put it in a paper he presented at a conference recently,

> …there are family building, there are culture building, and there are intimacy building prerequisites for language fostering, things that **you** have to do because no school is going to do them. However, the school can put that on the agenda of what has to be done. The school has intellectuals in it. The school has a building, a budget, a time, and a place. Now it has to put the life of the language, not just the literacy of the language, not just the grammar of the language, not just the lexicon of the language, but the life of the language in the home and the community on its agenda if the language is going to be passed along.[xvii]

Just collecting documents and multimedia presentations of a language is not enough. In the end, language cannot live inside a website or a classroom, but has to spread out into the community and families and be in use to be revived.

What an electronic repository can become is a touchstone for those interested in a Native language. It can provide samples of language within the context of culture. It can provide an intellectual structure for studying a language on a continuum from beginning knowledge to linguistic expertise, or provide dictionaries or other tools. It can also be a colorful, resourceful Internet or computer place that provides for language enrichment in ways limited only by the imagination.

This does not encompass the possibilities for electronic repositories, however. In an article on the successful effort to revive the Imazighen (Berber) language in Africa, the linguistic scholar Amar Almasude describes how a number of electronic technologies played a key role. As is true of most Indigenous populations around the world, the Imazighen language was repressed. In the case of Imazigen, it was repressed in favor of Arabic, the official language of Islam and the Moroccan elite. Schools have, for centuries, emphasized, "We have one religion, which is Islam, and one language which is Arabic."[xviii] This has been emphasized to the detriment to the Amazigha people.

For a number of different reasons, including interest by tourists in the language, the making of a movie in Imazighan, the playing of traditional music and the publication of a book, the Amazigha people became increasingly interested in their language in the 1980s. This led to the use of VCRs, email and other technologies, in an effort to bolster language use during the 1990s.

> With the availability of computer communication technology in the 1990s and the growth of an important Amazigh student body in the Western hemisphere, the Imazighen seized the opportunity to build worldwide forums. Through Amazigh-net, for instance, an electronic mailing list established in July 1992, the Amazigh cause took an international dimension (Bouzida, 1994). Currently there are also several dozen web sites that are concerned with the question of Amazigh identity and strategies to implement the Thmazight language into the curriculum and mass media.[xix]

This use of technology around the Imazighen language in turn helped build an Amazigh identity and led to increasing use of the language throughout Morocco. It also gave the language a greater degree of “respectability” among the Amazigh people.

The point this story makes is that the Internet is malleable, as much a communication as a storage and retrieval medium. If an electronic repository is linked to other tools, for either education or communication

purposes, it can play an important role in language revitalization efforts. This is true even if it is also true that an electronic repository on its own cannot save a language. It is one tool, not an answer.

Building an Electronic Language Repository

Before a Native nation or language group can create a project to build an electronic language repository, the group first needs to decide what it is trying to achieve. Are the people in the group interested primarily in preservation of Native speakers' voices? Are they interested in saving the language for future generations? Are they trying to recover a dying language? Are they going to use the repository as a resource for education? Will this education be aimed at beginning speakers or more advanced speakers, or both? Is the repository going to represent a major effort to store cultural artifacts, stories and voices, along with language materials? Each one of these questions has implications for the process of going about the effort to build a successful repository.

Having said this, however, it is also important to point out that such questions can be taken too far. As Fishman put it, the key to resuscitating a language is to start in the simplest way possible and then to build from there. He noted that too many times the enormity of the task, and the almost universal failure rate, discourages people too much from what is one of the most important efforts they can undertake. He urged those interested in saving languages to start somewhere, anywhere. Just start.

Implications derived from the above questions help define how to move forward. For example, if you are trying to build an historical record of the language so that you can at least preserve the possibility that future generations can revive it, the art and science of linguistics is highly important. It pays to engage professional linguists who can create a way to communicate pronunciations, context, speech rhythms, meanings, syntax and a host of other concerns to those who, in the future, will undertake the task of understanding and reviving the language.

If, however, you are primarily interested in recording Native speakers for the historical record, saving their inflections, accents and patterns of speech, or keeping for the future stories or ceremonies true to what they are meant to be, the task is much simpler. You need to record the speakers' voices selected for preservation using professional equipment, preferably recording them electronically rather than with a tape recorder. Or, if they prefer to be recorded using a tape recorder, methods for transferring tapes to electronic media are really advanced. You will need to catalog the work done so that it can be found by using annotations, keeping careful records of each session and creating menus. But, in the end, the recordings can be stored on a CD, in a hard drive or on the Internet. It is not necessary to spend huge sums of money for linguists and software designed to help make syntax and other speech and context considerations clear.

No matter what the purpose for your electronic language repository is going to be, however, there are some paths that should be explored. Does your nation, tribe or language consortium have, in-house, the expertise to do the writing, recording, storing or technology work required? Part of the requirements are related to computers, storage, networking capacity and technical support capability overall. Other requirements are related to software, security, and web design or programming skills.

Variations in all these areas are linked to the project the group attempts to implement. In a project like the Lenape project, requirements can be modest. Most computers have the ability to create CD-ROM files these days. Digital recording equipment will be needed, along with the software to transfer digital recording from the recording unit to the computer. Also important is the ability to edit sound quality in cases where problems exist. Web design skills would be useful, although the skill level probably would not have to include more advanced abilities, such as mastery of Common Style Sheets (CSS) or java. Using one of the software packages designed to help develop websites, such as Microsoft's Front Page or Mozilla's Composer, could take care of the required tasks.

A project like this can create more demands, again based on the sophistication and complexity of what is attempted. If the project developers create so many recordings and translations that a database is

needed to help keep track of them all and provide a successful user interface, then database skills will be needed. If there is a desire to put the project on the Internet, then security and web page design become increasingly important and demand higher skill levels. Such decisions can also increase the amount and power of the computer hardware needed.

Hardware and skills demands of a project like the Ulukau project are much more sophisticated. Not only are high quality scanners needed, but cameras, pdf software, editing software and skill in using programs like Adobe's Photoshop or Illustrator are needed. Web design skills become more important also. CSS skills would be recommended along with an understanding of handicapped accessibility since users from all over the world are expected. Files need to be placed within a database format workable on the web. Security, networking and broken link skills also become important. Documents will inevitably be in different states of readability, sound recordings will be in various states of usability and fragile materials will need to be handled with care. Skill levels of those working on the Ulukau project are inevitably high and can be expensive. Hardware and software costs also can be high.

A simpler project with some of the Ulukau attributes is possible, of course. A good example is the Internet site, "Tohono O'odham (Papago) Literature."[xx] Containing poems, stories and even lessons on the O'odham Language, this web page was developed by a partnership between Ophelia Zepeda of the University of Arizona and a skilled web developer, Glenn Welker. Language lessons were created on a computer, reducing the expensive cost of scanning and editing. Computer demands, since this is a much smaller project, were minimal compared with those for the massive Ulukau effort. Dr. Zepeda, a member of the Tohono O'odham Nation, is a top linguist, who won the MacArthur Foundation Award, often referred to as the "genius award."

Only an exceptionally well-endowed project could possibly attempt to match the standards of projects like the one at the University of Indiana's American Indian Studies Institute. If the choice is to become extremely serious about documenting a language and saving as much of a traditional culture as possible, the best option is for the Native nation or other group to find a major university with scholars and technicians interested in their nation with which to work. A team can be assembled within a tribal or language group setting to accomplish this, especially at one of the tribal colleges or universities that has a great deal of technology and/or linguistic/cultural expertise. But, expertise levels in technology, linguistics, culture and web design are going to have to be exceptionally high.

One of the more interesting options for Native nations, tribal colleges and universities and Native organizations is the Indigenous Knowledge Management System and metadata repository project at the National Museum of the American Indian (see description of this project earlier in this Chapter). NMAI and the DSTC are willing to allow use of the software for free, or with a small licensing cost in the case of the metadata repository project still under development, to eligible institutions. Participating institutions will have to pay for training and the work needed to put documents into the database. They also have to cover hardware costs, which can be substantial. In many ways, this is an option that can benefit language and cultural repository projects, and even efforts at using repositories as part of an asynchronous learning strategy, at relatively modest costs compared to the sophistication available.

The Trail to Building a Virtual Language Repository

Action	Considerations
Step 1: Ask the question: Why do we want to build a virtual language repository? • To provide a record of the language that can be used by future generations to study and/or resuscitate the language? • To provide a source of knowledge about the language to tribal members who have moved to cities or other countries? • To act as a tool in helping to save the language? • To provide one element of an electronic strategy that utilizes additional tools such as bulletin boards, email, music recordings on the Internet, oral discussion forums over the Internet, etc. to increase language usage? • To increase active participation in language usage? • To provide an oral history of cultural knowledge such as stories or teachings? • To preserve the voices of current speakers of the language? • To act as part of an education strategy in the teaching of language and/or culture?	Write down the answers to each of these questions, then decide on a strategy to accomplish the goals based upon your answers. • If your goal is to provide a record of the language that can be used by future generations to study and/or resuscitate the language, then your strategy will require expertise in linguistics as well as technology. Linguists provide the tools to communicate language structures and meaning across time. The technology required for such a project will also be highly sophisticated. • If you simply want to provide a source of knowledge about the language to tribal members who have moved from the reservation or community, you can decide to use CD ROMs, the Internet, or even tape recordings to capture samples of language usage. Then you can translate the samples using simple written materials. Illustrations and art work can be used on the Internet to increase your presentation's effectiveness. • If you want to provide one element of an electronic strategy that utilizes additional electronic tools to increase language activities, you need to identify which tools you want to use and work to build electronic communities that will use these tools in a conscious strategy to save the language by increasing usage. • If you want your electronic language repository to be useful as part of an educational strategy to teach the language to new generations of speakers, you will need to build e-learning tools into the repository and work with educators to structure lessons, classes, and even degree programs. • Any one repository project may have multiple goals and pursue multiple strategies to achieving those goals.Avoid widows and orphans
Step 2: Identify what technologies are going to be necessary to achieve your goals.	A wide range of technologies is of possible use to an electronic language repository. Some of these technologies are hardware related. A large repository, especially one that uses photographs, audio, and/or motion, will require sophisticated server technologies with lots of memory and hard disk storage. The issue of security is extremely important. Who should be allowed to access what materials? This question can demand both hardware and software solutions. A sound lab can be as simple as an electronic or standard tape recorder. Or it can be so complex that it demands equipment that will require skilled technicians to save and enhance

	recordings that are old, have been stored on obsolete technology, or were poorly done. If you choose to simply store oral history or stories on CD, all you may need is a computer with a CD-ROM burner and the appropriate software. Developing a web site for an electronic language repository can be equally simple or complex. You probably should seriously consider using Common Style Sheet (CSS) and handicapped accessibility standards, although you can choose to use much less sophisticated tools like Microsoft's Front Page software or Mozilla's Composer software. CSS can help users with a variety of search engines to view the repository site. Other tools can range from Macromedia's Flash software to Adobe's Photoshop. Interoperability and scalability of the site are also important attributes that need to be taken into consideration. Then you need to decide how people can find what is included in the repository. Will a simple menu work? Or do you need a web-based database? Related to finding what is on the site are tools that can be built into the site. Bulletin boards, instant messaging, telephony, white boards, java chats, editing software for both sound and text, PowerPoint presentations, and annotation tools for site users only start to describe the options available. Even maintaining the site can be complex. Do you need a document management system? Is linkbot software going to be enough if you include links to other sites? Or do you need a more sophisticated broken link finding and repair capability? Expert help to answer these questions is important.
Step 3: Identify the partnerships, expertise, and resources needed to implement research, technology, and linguistic strategies important to achieving project goals.	Few organizations or Reservations are going to have the expertise in-house to accomplish a highly sophisticated electronic language repository. Those deciding to build a repository are going to have to build one that matches skill levels of those charged with the construction process. Or they are going to have to hire expertise, find qualified consultants, or build partnerships to accomplish the desired work. One note of warning is that many consultants with a certain level of computer and software skills may not realize they do not have the skill to accomplish a more sophisticated project. For instance, are they experts in CSS? Do they know how to record high levels of sound quality electronically? Do they know enough about linguistics to match the requirements of the site to the standards of linguistic presentation? Can they rescue either sound or video-taped presentations from outmoded technology and then transfer it to an Internet site? In most cases partnerships will be necessary to successfully build more sophisticated repositories. Some of the tribal colleges and universities have significant technology, linguistic, and/or educational

	resources available. The National Museum of the American Indian and the University of Queensland partnership has much to offer. A number of universities, ranging from the University of Indiana to certain community colleges to international organizations such as the World Indigenous Nations Higher Education Consortium to the Massachusetts Institute of Technology to the University of Arizona can provide funding possibilities as well as linguistic and technology expertise.
Step 4: Identify what materials, resources, people are available in the community to provide substance for the repository.	Technology decisions are important, but even more important are the material, people, artifacts, and other resources available in the community for the repository. What formally trained expertise in the language exists locally? How many speakers are willing to work with the repository project to provide oral history or cultural materials? How much library material on the language or culture exists that can be used? Has the tribe or local schools or Head Start programs undertaken oral history projects? Do regional libraries contain recordings, videos, or microfilm of materials that can be used? Can materials, photographs, recordings, or videos be secured from the tribal museum or other local museums? What about letters that individuals have in their possession? Does the tribe or a local county or historical society have an archive that will be useful? What financial resources are available? Local content can also be secured from national institutions like the National Museum of the American Indian, the Library of Congress, the National Archives, and possibly even from a private institution like the Heard Museum in Phoenix, Arizona. This means that research is an important component of finding resources related to the community. Keep with above
Step 5: Develop a budget tied to a timeline and the project's goals.	Remember that an electronic language repository is a long-term effort. It must be maintained over years rather than months. Construction costs are vital, including the people and technology needed to make the repository happen, but technologies need to be maintained, new materials added, and users supported. Costs can be modest at the low level of technology, e.g., developing an effective CD to teach young children about the language, or developing and maintaining a menu-based web site that contains a limited number of written materials and illustrations. But the more sophisticated the repository, the more funding will be needed to both develop and maintain it.
Step 6: Work at raising funds for the project.	Raising money for any cultural or language project in this country is difficult. However, some possible resources are: • The Administration for Native Americans. • The Native American Languages Act. • Certain Department of Education programs such as Bilingual Education (primarily available to K-12) schools and school districts, or Title III of the

	Higher Education Act for tribal colleges and universities. • Head Start and other early childhood programs. • Foundations like the Grotto Foundation and the Endangered Languages Fund. • Certain National Science Foundation programs, especially as those relate to researching how to develop electronic language repositories, primarily available to colleges and universities, including tribal colleges and universities. The Tribally Controlled Universities Program managed by NSF can also be used using a successful project design. • Tribal governments. • Tribal casinos. In most cases projects will have to be put together from multiple sources of funding.
Step 7: Implement the project.	

Conclusion

Those who wish to create an electronic repository have a lot of options. They can go it alone and create either a simple or complex program based upon existing materials, such as videos or sound recordings. They can pursue partnerships with tribal colleges and universities or other educational institutions in their region to accomplish more complex tasks. Decisions about which path to pursue should be based upon the purposes of the effort to create an electronic repository.

By themselves electronic repositories are not an answer to language preservation. However, they can be useful as part of an overall education program, and they can preserve vast amounts of material and information for future generations.

One note that should be taken into consideration for those interested in electronic repositories is that computer and Internet technologies are best at encouraging collaboration and making materials available over distance. Native people distant from their nation or community in cities or other lands can access electronic representations of their culture and language wherever they live. Linguists and other experts, if they are not located in the community, can be easily accessed through partnerships and collaboration projects. By joining efforts such as those developed by tribal colleges and universities, the University of Indiana, the University of Arizona or NMAI, Native nations and language communities can engage enormous regional, national and international resources for their locally controlled and developed efforts.

Saving languages is important work. Educating about languages is equally important work. Language is the heart of a people. Inside a language is the expression of that people's heritage and culture in its purest form. An electronic repository can play multiple roles in the great effort to bring Native languages alive in the contemporary world.

PHYSICAL REPOSITORIES

Building a Physical Repository

The location of the repository will determine the characteristics of the building materials. The location and orientation on a particular property will determine the type of heating, ventilating and air conditioning system to be utilized.

Within each geographical region, there is a wide variety of microclimates. It is important to look at the

microclimates, because each one will have certain characteristics and will involve its own considerations. For example, are termites prevalent? On what type of land will the repository be built (i.e., granite, solid rock, sandy or clay soil, etc.)? The specific conditions will determine the type of foundation and type of materials to be used for walls, roof and floors.

It is important to talk with local architects to find out what materials are used locally and how they stand up over time, given the particular factors in that microclimate.

After determining the microclimate and having chosen the types of materials, the Native nation or language community can then look at the local people and all others who will use the facility. In the case of an archive, the group must determine the types and quantity of materials to be stored in the facility. The size of the facility, as well as specific designations for areas within the facility, will be determined by the specific types of collections and requirements of the materials to be stored there.

Once the group knows exactly what will be stored in the facility -- and projects beyond quantities at the current time to future quantities over a period of time – the group can then size the different rooms within the building. The main factors which will determine arrangement of interior space are the size of building; the types of population (public, staff); and the type of relationship the group wants its elders, researchers and staff to have with the public (intermingling, partial or total separation).

The group needs to determine if it will build an environmentally friendly repository. One may or may not be cost effective, and probably would be somewhat costlier. Certain costs can be controlled, but this is sometimes done at the expense of the longevity of the building. Most builders do not currently utilize materials and methodologies for environmentally friendly buildings, and those who do bid higher because they are bidding their learning curve, as well. This affects the total cost of the building.

The kind of building that is best for an archive or archival repository is one that does not immediately respond to its environment. That is, when it becomes hot or cold outside, the building does not immediately become hot or cold inside and there is a lag time before temperature rises or drops.

You are looking for a building that is massive enough in structure to maintain a constant, controlled environment. This is needed to maintain good preservation; for example, to keep the records free from mold, mildew and pests.

Various forms of concrete are the best materials to use in any building situation. Concrete has a very long thermal lag: when the temperature drops quickly outside the building does not change that quickly inside. It is cheaper and easier to heat or cool, and also to maintain the heat or cold. Concrete can also be sealed to the point that it is actually impermeable to bacterial forms, pests, etc. On the east coast there is a plant that manufactures **Hebel Block** (see Glossary).

For the interior, **Radiant heating and cooling systems** are best (see Glossary).

Stucco and **slump block** (see Glossary) are very common and relate to the indigenous architecture– adobe blocks. Adobe is high maintenance but slump block does not require high maintenance. It is termite proof, fire proof, and costs very little to heat and maintain.

The ideal situation is to have no windows and no doors; then you have total control. Introduce windows and you are introducing a change in the climate control system that is rapid and requires much more immediate response.

You can put in a lobby or public area that is well lighted but is still well insulated from the rest of building with thermally insulating walls so you don't have to worry about the archive stack area where the collections are housed being affected.

The actual interior spaces will be determined by the particular facility itself. The research room would be separate from the stacks. It would be best to have a transition space between the stacks and the research room to allow for better climate control in the former.

Another building form developed in recent years but not used much until the last four or five years is the **Insulated Concrete Form (ICF)** (see Glossary),

Another type of extremely useful architectural material is **Therma-Steel** (see Glossary) panels for the roof:

ICF, ThermaSteel, and **Insul-Deck** (see Glossary) are good forms for longer spans, depending on the shape of the building. Applied styrene material with T-bar concrete is a thermally isolating material for spaces - a great insulation to keep hot, cold or cool. This material also minimizes any type of rodent or other insect infestation because it's not a material that is consumed by pests.

ICF and ThermaSteel are fairly cost effective and can be constructed by a decent carpenter with a little construction experience using lay people. They can build the ICF forms, mix and pour the concrete, put rebar in, and build the building themselves. It's done quite often. Habitat for Humanity has done quite a few buildings that have utilized these materials.

Other materials available: **shockcrete** (see Glossary) forms that go on in-steel panels, plaster on either side of the in-steel panel. One problem is sound: you get a hollow sound on the inside.

Two types of roofing are pre-manufactured ThermaSteel and Insul-Deck. Insul-Deck can be used as a roofing or flooring system. If the floor must be put 6, 8, or 10 feet above ground because of flooding or other reasons, Insul-Deck can be used and is so strong a small pickup can be driven over it.

Accessibility is extremely important as codes, such as the Uniform Building Code, change. The requirement is to allow everyone to access spaces as equally as able-bodied people. People in wheelchairs or on crutches, the visually impaired, those with other impairments are now protected by the Americans with Disabilities Act (ADA).[xxi] The width of aisles and doors, the clearing around doors so one can bring a wheelchair up to the door and have access to the door handle without impairment, toilet facilities, kitchens, the height of counters and cabinets, all have to be designed for that type of accessibility.

If you are a federally funded project, ADA requires that your employees also be capable of utilizing the facility. For example, the archives may employ a person in a wheelchair who must have access to all areas of the archives. You must look at local codes to see if you are obligated to meet accessibility requirements for employees as well as the general public. Around the outside of the building itself, there must be safe accessibility, which means that for van access, for example, the building must be built in such a way that someone in a wheelchair doesn't go rolling down a hill when they get out.

You must look at federal, state, and local (e.g., county) laws; for example, California is in conflict with the federal government about which guidelines govern in certain situations. That must be resolved before making final design decisions.

If the building has more than one floor you have the same regulations: If staffed with someone in a wheelchair you will need to consider putting in elevators. Mechanical systems, such as elevators, bring the cost up tremendously. You have to ask yourself if it makes sense to build two stories. Everything in the building must be accessible: kitchens, bathrooms, toilets. It is best to have a unisex bathroom because of the difference in utilization of toilets by males and females: males usually spend less time, and females would then have access to all the toilets when not being used.

How do buildings differ and how do you get them to be more than just concrete blocks? Whether block or plain concrete, you can use the outside as a place for a mural or castings of specific tribal symbols which can be done locally to distinguish the building and give it some specific relationship to the area or tribes

who are using archives. This should be done by the local architect in conjunction with whoever is utilizing the building. Tribes can give information and the architect can take the symbols and translate into easily duplicated concrete stucco or imprinted forms that can form the actual architectural detailing on the building itself. You can also have colored panels. The architect can sit down at the computer, clients can give information and the architect can show what it will look like and get comments at that time. You have a direct client relationship, and it is extremely productive to get feedback right away. You must first determine what the medium is going to be: what concrete form and what method of production is available. The fact cannot be overemphasized that you can plaster stucco onto any form of concrete; stucco can be carved, shaped, colored, and tiled. Mosaics done with broken tiles made into patterns of symbolic designs can be extremely beautiful. You can get the broken tiles from the quarry, tile shop and similar places that sometimes give them away because they are broken materials.

Concretes have changed quite a bit over the past 20 years. The Center for Advanced Cementitious Materials (ACM) located in Champaign/Urbana is an organization funded by the concrete manufacturers and the American Concrete Institute. It is funded for the purpose of experimenting and creating new forms of cement-based concretes.

Originally, concrete was only made of cement, lime and sand, with the addition of rock. That was the way the Romans did it and the way we did it up to a number of years ago. But they looked at ways to make it less brittle. That's when they started adding additives, such as materials which made the concrete set slower, plasticizers which kept it more flexible, retardants which kept it from drying quickly, and the addition of materials which could inhibit the microcracking that occurred. Initially they added very thin pieces of steel fragments which gave it strength and prevented it from cracking. Concrete is good in compression and lousy in tension. Steel rebars make it take a certain amount of tension and give it more flexibility. They went from steel particles which rust to polypropylene fibers, commonly known as fibermesh, which gives concrete the ability to withstand microcracking over a period of time. They also have additives to do a lot of different things for concrete; for example, concretes which can set up under water and concretes with all different types of strengths and consistencies. You can basically get concretes custom tailored for what you need.

Concretes have the ability to provide the characteristics where you want things to remain constant. Any kind of organic material is subject to the microclimate in which it is located. Even concrete is subject to the microclimate and must be mixed for that particular climate or soil, such as very alkaline soil. You must analyze the soil and given the specific chemical characteristics of that soil, you need to find out what is best to maintain the concrete's integrity over time.

Concrete can be used in any area; there are manufacturing plants in all areas. Block manufacturers can stamp out different forms. Concrete blocks provide the same type of insulating characteristics as concrete. They come in 10- to 12-inch widths. Hebel block can be assembled by unskilled labor under the direction of a carpenter; ThermaSteel panels can be laid out by two people very quickly. Labor, which is at least half the cost in a construction project, can be cut down considerably by using products which can be manufactured in the factory and assembled on site. Hebel block, Insul-Deck, ThermaSteel, and ICF are probably the easiest to do.

The cost of concrete is more than comparable to any kind of frame construction. Cost depends on how you lay out your building, and having someone knowledgeable put together something that is not complicated to form up. If you have to use a lot of plywood in extremely complex forms in which to pour the concrete, then the costs go up. If you've designed something where you have ICF concrete forms– they are the forms, they go up, they stay in place; you pour the concrete, enclose the outside and that's it. No plywood to take off, no wood to buy.

With respect to concrete as a building material, the shape of the structure is important to consider. A curved structure requires a lot more formwork if it is a poured concrete structure. You must have plywood, formwork, support systems, etc. The cost of labor to erect the forms, pour the concrete in them, and take off the forms is not minimal. You are left with a wonderful concrete structure, but have paid a lot of money

to build the forms out of plywood and then to strip them down, and you have also thrown away a lot of good wood.

ICF forms stay in place. Poured concrete can make interesting shapes but you pay for that because you pay for carpenters to create very unique shapes out of wood and then pour concrete around them which is pretty expensive. With ICF blocks you can make angles or you can make curves to a certain degree. Depending on the area of the country you are in, the Hebel block would be better because you can sculpt whatever you want out of it. It is probably much cheaper because given the opportunity to sculpt a building, you would probably have a lot of volunteers.

ICF, Hebel block, or solid concrete block, including slump block, are extremely quick to do as well, and good concrete masons can put up walls very quickly with them. However, they do not have the same characteristics. ICF already has insulation. Hebel block's air pockets already have insulation in them. Concrete block is quick and fast, and slump block looks just like adobe block on the inside and on the outside you can plaster over it or leave it exposed. Slump block is not a concrete block that you put rebar into or pour concrete into, so you must be careful how slump block works in seismic areas because of rattling.

The type of building is governed by building codes that govern that specific area of the country. For example, there are four basic levels of seismic zone in the country. California is zoned 4, the highest level. Thus in California you must build to a different standard of safety, a different structural stand. In Florida there is a hurricane code based upon hurricanes so you must design based on wind factors. In Louisiana, because of the tropical climate, you have a whole different set of materials you must deal with. Microclimate is very important and local building codes are very important: they will tell you at what level of structural integrity you are required to build. In every area concrete will apply, but the way in which it is reinforced and assembled will differ depending upon the particular zone you are in and the building code that applies in that zone.

Freeze/thaw areas are important because you have a condition in which the foundation is being pushed at by different forces. You must approach the design of the foundation differently. Most of the time, you must go below the frost line. The person in charge of the design must consider such factors. The best way is to work with someone local who lives in the area and has been using building codes for a long time and has 15-20 year's experience designing for that particular area, and is comfortable with the local building officials.

Building officials are the final word and it is extremely important that you take your preliminary designs to the local building department and begin the process with them so they can be brought on board early, and you have no surprises once you finish your design. They have the right by law to veto or to change almost anything you do in a building; but they also have the right by law to make exception to the code. You cannot fight them or argue with them. They will tell you a lot about what you can expect in an area and they have a tremendous amount of knowledge about local building techniques and technologies.

Even if you are not required by law to get approval by the county or city, it does not hurt to have your plans reviewed by a local official, because there are contractors out there who for one reason or another may or may not do a safe job. Everything building code officials do is meant to promote the public safety; but a private contractor, if not reviewed, may do something that may not be as safe as it should be for that particular area. So it would be good to have a local official look at it, even if the official doesn't have to approve it, just to make sure that the contractor meets local safety requirements as well as accessibility requirements, and that the building will stand up in the worst environmental situation. Building codes are the minimum required for safety; when you build to them you are doing the minimum so you want to at least have that.

Remodeling an Existing Structure

Almost every city and county in the country has an environmental health department; you will have to check to see if the city or county in which you will be building or renovating your facility has one. If it does

there will be rules, regulations, and requirements for the remodeling of any building. These rules relate specifically to health and safety. For example, they will tell you what type of surface materials you have to use in a bathroom. If it is an older building, you will have to resurface all the walls and floors. They will require floor drains and specific types of laboratories. If there is a kitchen used by a staff, they will be very specific about the types of sinks, types of floor sinks (which are used under the sinks), types of wall materials, types of floor materials, and types of drains that have to go into the building.

In some cases, it can depend on the percentage of the building you are remodeling. For example, in Oakland, California, if you remodel more than 50 percent of the building you are required to bring the entire building up to code. That is an enormous expense. So it is something you should check out before remodeling. Depending on the type of building, the environmental health department also has requirements in terms of the type of support rooms you must have. Determine the codes that will impact your remodeling and will affect the other portions of the building you are not intending to remodel or have no funding to remodel. It is best to check with a local architect who knows the codes and can advise you; even if you don't get the architect to do the design, talk with him and discuss the codes and how those codes will impact you.

Besides specific materials and equipment required for bathrooms and kitchens, there are also requirements with respect to disposal. For example, if you have a kitchen there will be requirements for the type of dumpster outside, location of the dumpster, the space around it and access to it. This is not a trivial question, whether it's new construction or remodeling.

What makes it difficult in remodeling is that you already have a predefined structure and you have to now make it accommodate the new codes, regulations, and requirements. It is important to get the specific codes from the environmental health department for the specific geographic area that the building is in, and utilize those in your design. Immediately after you have completed your design, even in the preliminary stages, you can submit your plans to the local environmental health department and request a preliminary review, and in that review they will let you know what you are lacking, and give you specific information as to what needs to be added. That will ensure that you meet the local codes for environmental health.

There are two approaches to remodeling: a single use building, in which the entire building is used for an archives, and a multi-use building, where only a portion of the building will be remodeled for archives. Take, for example, remodeling of a community center. As a single use building, occupancy classification is quite simple and has no complexities; but as a multiple use building, different uses are considered separate and distinct occupancy classifications. Both national and local building codes have very specific requirements as to how you must keep occupancies separated. For example, some require 4-hour firewall separation. This means that when remodeling the building you must build walls between the separate occupancies that will withstand a fire for four hours before collapsing. These firewalls have to go from the very foundation all the way up through the ceiling to the roof, so that the fire cannot penetrate any openings. Openings between firewalls have very specific architectural requirements for protection so that the fire cannot spread through ducts, shafts, electrical outlet openings, switch openings, etc.

You must examine your local and state codes to find out specifically what occupancy classifications govern specific uses that already exist in your building, and what the occupancy classification is for the new use you are planning; then, you have to research what is required when you have these occupancies sharing common walls. Also, relating to exits: you have very unique situations depending on the configuration of the archives, corridors to it, very specific requirements for fire exits, path of travel from farthest point to nearest exit door, requirements in terms of distance you can go, required signage, alarms, as well as the ADA (Americans for Disabilities Act) requirements for the hearing impaired, such as flashing strobe lights, etc. You must also comply with federal, state, and local ADA requirements. Requirements dictate how you lay out your rooms, such as meeting needs with respect to access and egress to the building. Remodeling when you have a multiple use building is a little more difficult than when you have a single use building.

In addition to the above fire safety and health requirements, you have a question of remodeling as it relates to the actual space itself. The first consideration is structural: The existing building is designed for very specific loadings, given in pounds per square foot for live load and pounds per square foot for dead load, which reflect the intended use of the building. Using the community center as an example, offices would have a very specific classification with respect to how much load per square foot would be on those floors. With archives, you are talking about placing on floors that were designed for one purpose loads that would easily exceed the structural design limits. At all times you are required to obtain a structural engineer who will give you an analysis of the existing building and determine whether or not the existing structural requirements meet the new loading characteristics. The engineer will tell you if the structure of the building has to be upgraded to meet the new loading requirements. Often the cost can be quite prohibitive since the structure of any building is not easily accessible, and depending on the type of structure may or may not lend itself to being modified for archival use. It is very important that in the very beginning of the process you obtain a structural engineer to determine if a specific building will even work as an archives, given the loading situation that you will require with cabinets, papers, books, shelving, etc., which can be very heavy. Have the loading requirement looked at the very first thing before you get too far into codes and other design aspects because if the building cannot be modified you are just wasting money and time doing other studies, analyses, and design work.

Once the structure of the existing building has been looked at and found suitable or easily modifiable within budget to accommodate archival use, the next step is to take a look at the ability of the building to meet specific mechanical requirements with respect to heating and cooling, so you can maintain the climate control required for an archive. There will be different requirements in Louisiana than in Montana, California, the Midwest, or the Northeast. Most buildings will already have heating, ventilating, and air conditioning systems, which may or may not be modifiable and useable for remodeling. These systems are usually less expensive items to adapt once it is determined whether they are useable or not. You can hire a mechanical engineer to determine if you have the means to modify the existing system or to add on to it a separate system for the purpose of maintaining the type of climate an archive demands.

In terms of utilities, you will have to take look at the electrical system. Most buildings have wiring and a panel which accommodate a certain electrical load. Very often in a building's life many gadgets are added and electrical equipment is upgraded. It is almost a truism that whenever you upgrade a mechanical or electrical item the requirements go up, never down. If an older building with a 400 amp circuit panel and 120 volts coming in has no excess electrical capacity, then the building will have to be rewired to meet the needs of the new electrical and mechanical equipment. This is not an insignificant cost factor. You must have an electrical engineer evaluate the existing panel. You should know by now what your equipment will be and what you will be adding to the existing load, and the electrical engineer will be able to tell you whether the existing panel can accommodate it, and, if not, what must be done to upgrade. Upgrading can sometimes be a simple thing and sometimes as complex as having the local utility add a new transformer to the local telephone pole, because there is not enough power to accommodate your new electrical needs. This is something which has to be developed by an electrical engineer.

Sewer systems should be adequate because sewer systems are normally sized for a generality which can accommodate an increase in loads. However, depending on your facility, it wouldn't hurt to have the mechanical engineer take a look and determine that you have adequate facilities for adding on to the sewer system and for your water supply, if you're bringing in new bathrooms or a kitchen.

The building itself is also a concern. This is a very building-dependent question. Some are brick, some wood, some stucco inside, some sheetrock, some paneled, with different types of interior designs. When it comes to remodeling you must look at the flow pattern. In a single use building it is fairly easy to get in and change walls, corridors, doors, rooms, etc. Some walls are load-bearing walls and cannot be removed. A structural engineer will tell you which walls can and cannot be removed. To make it work for new occupancy, you must make sure that wall, floor, and ceiling configurations correspond to fire and structural requirements for new occupancy. These are specifically laid out in the Uniform Building Code or the National Building Code, whichever applies to your area. In the case of a multi-use building, the most difficult design problem is to plan a circulation pattern that accommodates both existing uses and the new archive use. It would be very wise to seek out the services of an architect who is skilled in interior design

work and commercial work that's related to the existing functions as well as some experience in working with archives. TThe architect can provide two or three alternatives for a circulation pattern that will meet the existing needs of the facility's occupancy as well as your needs, and still be within in the parameters of fire code regulations, access and egress requirements, and the like.

In the process of planning a layout for a single or multi-use building, it is important that you obtain alternative preliminary, almost schematic designs, so that before you are committed to a final design development, or production drawings., you have a chance to evaluate several alternative designs to be sure that they are really accommodating your specific needs with respect to circulation, privacy, and sound control, and other factors. And also in a multi-use building you must make certain that your design does not interfere with the access, egress, and service requirements of the already existing occupancies.

If the building is structurally sound, there are a numerous number of materials that can be utilized on walls to make them impervious to moisture, bacteria, and fungi. Some are materials that are actually used in bathrooms and kitchens. Durock is one cement board that is waterproof and is used as a backboard behind your finished materials. Greenrock maintains excellent stability and can withstand any kind of vapor penetration. In ceilings, materials can be used as vapor barriers and can stop any vapor from entering the room. But this will require stripping rooms of their existing coverings and redoing rooms in materials that will provide vapor proof barriers. The doors will have to be replaced with doors that are soundproof, leakproof, and airproof to prevent any modification of the climate that you want. Assuming that has all requirements have been met; that there are no major structural problemsand structurally you can rehabilitate the building; that electrically and mechanically you can provide sufficient power as well as a sufficient HVAC system; that you have looked at the circulation flow to accommodate the new use and the existing use, and worked out a reasonable circulation pattern, you basically have the definition and division of spaces and actual materials to use to make the building or room function for archival purposes.

It is not possible to give an estimate of renovation costs because all structural situations (contractor fees, materials, plans, designs, HVAC, mechanical and electrical systems, and so on) will be different according to the location. You can check some of the costs from a book entitled *RS Means Building Construction Cost Data 2005* which contains unit costs for more than 23,500 building components. These costs are prepared from the experience of thousands of contractors and suppliers in the twelve months just before the book is published. There is also *Means Square Foot Costs 2005* which is useful to anyone who needs rapid budget cost estimates. This book gives you clear descriptions and illustrations of hundreds of residential, commercial, industrial, and institutional buildings.

Hazardous Materials and Contaminated Objects in Archives, Repositories and Museum Collections

Language materials which have been or are being stored with a museum collection or in older buildings could pose a danger to people handling them and to materials that come into contact with them. Practically all museum collections contain objects that present a risk to other objects in the collection, to museum workers and to visitors. Paper collections, audio recordings, video tapes, film, photographs and other historic language materials may have been or may be stored with contaminated museum objects. As a result, these materials may have been or may be cross-contaminated. The extent of this risk is difficult to predict or assess at this time and there are very few published scientific studies that quantify or draw conclusions about the risk. Archival materials stored in historic structures with damaged ceilings, boards, finishes and tiles may be contaminated with lead or asbestos, and caution should be used in handling them.

The following list, which is by no means exhaustive, provides examples of potential health and environmental hazards in archival repositories.

- Active mold, such as *Stachybotrys atra*, can trigger allergies, infections and asthma. Dust on collections exacerbates the problem because it absorbs moisture, which in turn allows the growth of mold. People performing renovations/cleaning of widespread fungal contamination may be at

risk for developing Organic Dust Toxic Syndrome (ODTS) or Hypersensitivity Pneumonitis (HP). ODTS may occur after a single heavy exposure to dust contaminated with fungi and produces flu-like symptoms. It differs from HP in that it is not an immune-mediated disease and does not require repeated exposures to the same causative agent. A variety of biological agents may cause ODTS, including common species of fungi. HP may occur after repeated exposures to an allergen and can result in permanent lung damage.[xxii]

- Decaying cellulosic materials – which form the base of motion picture film, photographic still negatives, X-rays and similar materials -- can out-gas and damage lungs and nearby materials, and pose fire hazards.
- Animal and insect residue -- including bat, bird, rodent and insect corpses, excrement, frass, feathers and nests – carry bacteria and viruses, and can spread disease.
- Friable asbestos particles or similar fibers and lead from ceiling, pipes and flooring can cause brain damage, lung disease and cancer.
- Bacteria, fungi and yeasts can result from animal or insect corpses or waste, flooding, moisture or simply high humidity.
- Arsenic compounds once were used by museums and other collectors as a preservative on sacred objects, cultural patrimony or biological or ethnographic materials as late as the 1980's, although there have been observed incidents of arsenic use after the 1980's. Some of these items are being repatriated and may contaminate language materials at dangerous or deadly levels over a prolonged period, if they were ever stored or handled in the same locations or with the same packaging materials. Arsenic compounds retain their toxicity and once treated objects containing arsenic can never be fully decontaminated. Arsenic causes both short-term and long-term effects including respiratory and gastro-intestinal problems and various cancers and reproductive problems. [xxiii], [xxiv]
- Historic photographic equipment can contain arsenic, mercury and other dangerous compounds, sometimes in deadly amounts. Mercury can cause nervous system damage including loss of coordination, tremors, and mood and personality alterations, as well as kidney damage and birth defects.
- Fire- or flood-exposed archival materials can contain mold, soot or PCB contaminations, which can cause disease.
- Radon created from the breakdown of uranium in soil, rock and water can out-gas into buildings through cracks, gaps, cavities walls, floors, joints and service pipes, and can cause lung cancer.[xxv] While radon does not contaminate an object per se, it can contaminate work spaces especially in older, historic buildings.

General Guidelines for Handling Hazardous Materials or Contaminated Objects

Before beginning an inventory of language materials and objects, one should consult a conservator, chemist, industrial hygienist or toxicologist, or a combination of these professionals, to develop a holistic plan, a collections survey and a written policy for dealing with hazardous or contaminated objects. The policy should cover new hazards, including hazards as they may be discovered in the collection, new objects as they enter the collections and incoming loans. The policy should also cover documenting and labeling hazardous or contaminated item in two places: 1) in the database or catalogue as part of the documentation of the item, and 2) attached to the item itself.

In most instances, the best way of minimizing risk is simply to handle materials carefully and thoughtfully. Gloves should be worn when handling materials, not only to protect the material, but to protect the person doing the handling. It is also a good idea to wear a lab coat, mask and goggles in the storage area. Gloves, masks, goggles and lab coats should be washed frequently, but not with clothes or other items. In instances when gloves are not worn, care should be taken not to touch the mouth, nose or eyes after handling material, and hands should be washed thoroughly.

People should not spend long periods of time in closed storage areas and these areas should not be used as work places.

In storage areas, it is unwise to eat, drink, smoke, take medication, apply lipstick, use hand lotion, insert or remove contact lenses, lick fingers or put thread, pencils or anything in the mouth.

A dust particle mask will work as a barrier against airborne particles, but not as a barrier against fumes. If people in the storage area are allergic to any of the above-listed materials, a fit-tested respirator equipped with a high efficiency particulate air (HEPA) filter can be worn. Before wearing any respirator (defined as any close fitting face mask), it is important to have a medical evaluation and a fit-test.[xxvi]

Storage and work areas should be kept clean and free of dust and debris that can harbor harmful materials. Work areas should be cleaned with a HEPA-fitted vacuum.[xxvii]

If you conclude that you cannot safely manage any materials in your collections, consider isolating them or offering them to another archive or repository with suitable facilities and safeguards.

If cultural items in the language materials collection have been repatriated from museums that may have used poisons as preservatives, it is imperative to test them and to address their health and safety impact on people and materials.

A Native nation or language community must make policy decisions about collecting and housing language materials, in the event that any of the language materials are living beings or representations of sacred beings and, if so, how they are to be treated.

The language collections policy should all address all pertinent cultural considerations regarding the care, treatment and housing of cultural items. Many storage and preservation methods – such as freezing, plastic bags, anoxic treatments and pesticide applications – are believed to endanger living beings and sacred objects. Furthermore, isolation of contaminated collection objects may conflict with the need to have culturally associated objects together.

Alternatives to Pesticides and Sporicide in Archive and Museum Collections

The Integrated Pest Management (IPM) program is the standard for federal archives, museums and buildings, and can be modified for non-federal entities. The IPM strategy was developed in the late 1970's and early 1980's to reduce risk from pests and pest management related activities affecting the public, employees, park resources and the environment.

IPM is a decision-making process which coordinates the use of pest biology, environmental information and available technology to prevent unacceptable levels of pest damage by the most economical means while posing the least possible risk to people, property, resources and the environment. In IPM, the goal is not to eradicate pests but to keep them from overpopulating an area where they could affect visitor safety, harm resources or damage historic areas.-[xxviii], [xxix]

A model description of developing an IPM strategy for archival and/or museum collections appears in the National Park Service Museum Handbook, Part I, Chapter 5, "Biological Infestations."

Pests: Even with an IPM in place, infestations can occur. Prevention is always better than the cure, but when pests are found you should: isolate any objects to prevent the spread of infestation; identify the pest and where it is in its life-cycle; clean infested areas; and decide on the most appropriate treatment.

Two major alternatives to pesticide fumigation are temperature treatments and modified atmosphere treatments. With temperature treatments, utilizing a deep freeze unit (rather than a common household freezer) capable of lowering temperatures to -18°C or below within 24 hours for two weeks is optimal for killing all pest species with little harm to objects. The objects should be placed in sealed bags and, when treatment is finished, objects should remain unsealed until they have reached room temperature to prevent condensation on the object.[xxx]

Modified atmosphere treatments utilize specialized airtight containers and either exclude oxygen (anoxia)[xxxi] or introduce gasses such as nitrogen or carbon dioxide. Local or regional pest control companies should have the equipment and trained personnel necessary to control pests utilizing more "green" friendly options.[xxxii]

***Mold**:* Most libraries with mold problems may find that proper temperature and humidity controls and non-chemical techniques, such as book vacuuming with HEPA-filtered machines, work just fine to control a moderate outbreak. However, those who find that standard treatments are not enough to stop mold growth can consider using chlorine dioxide for its effectiveness as a sporicide. [xxxiii]

Chlorine dioxide has a strong safety level for library employees and visitors and is an effective alternative to thymol, which is known for its possible carcinogenic properties. Chlorine dioxide is packaged in self-activating packets and is hung with wire ties between bookshelves in a closed area. The treatment is especially effective in rooms that have fluctuating temperature and humidity levels- which are especially favorable conditions of mold blooms.[xxxiv]

Rodents: Hantavirus pulmonary syndrome (HPS) is a deadly disease transmitted by infected rodents through urine, droppings, or saliva. Humans can contract the disease when they breathe in aerosolized virus. HPS was first recognized in 1993 and has since been identified throughout the United States. Although rare, HPS is potentially deadly. Rodent control remains the primary strategy for preventing hantavirus infection. The CDC offers advice with their community health campaign "Seal Up! Trap Up! Clean Up!" The CDC recommends rodent control by sealing up holes inside and outside buildings to prevent entry by rodents. Trap rodents in and around buildings to help reduce the population. And finally, clean up urine and droppings and clean up rodent food sources and nesting sites.[xxxv]

Resources on Hazardous and Contaminated Materials

The following list is a starting point for background information on the handling of hazardous or contaminated objects and materials in your collection. Note: Most U.S Government agencies have American Indian and Native Alaskan liaison offices and are good sources of information for publications and contacts for developing policy and procedure plans, obtaining grants, and list local and regional contacts.

University and Non-Profit Websites:

Conservation OnLine (CoOL), a project of the Preservation Department of Stanford University Libraries, is a full text library of conservation information, covering a wide spectrum of topics of interest to those involved with the conservation of library, archives and museum materials. Website: http://palimpsest.stanford.edu/

The Northeast Document Conservation Center (NEDCC) seeks to improve the preservation programs of libraries, archives, museums, and other historical and cultural organizations; to provide the highest quality services to institutions that cannot afford in-house conservation facilities or that require specialized expertise; and to provide leadership to the preservation field. Website: http://www.nedcc.org/#

The Arizona State Museum is a national leader in developing novel conservation methods for repatriated materials to tribal communitites under the Native American Graves Protection and Repatriation Act (NAGPRA). Website:http://www.statemuseum.arizona.edu/index.html

U.S. Government Websites:

The National Park Service operates the Museum Management Program (MMP), which is part of the National Center for Cultural Resources Stewardship and Partnership Programs that provides national program support functions for park resources. It includes online publications, such as The Museum Handbook and the Conserve O Grams Technical Leaflets Series, which contain many chapters on health and safety issues. Website: http://www.cr.nps.gov/museum

The National Park Service also publishes the online journal "Cultural Resource Management". Website: http://crm.cr.nps.gov/issueindex.cfm

The American Indian Environmental Office of the U.S. Environmental Protection Agency coordinates the EPA-wide effort to strengthen public health and environmental protection in Indian Country, with a special emphasis on building Tribal capacity to administer their own environmental programs. Website: http://www.epa.gov/indian/

The Preservation Office of the Library of Congress offers online resources for technical information for librarians and archivists including caring for, handling and storing archival materials. Website: http://www.loc.gov/preserv/preserve.html

The National Archives and Records Administration (NARA) maintains an excellent website and has several online publications dealing with holdings maintenance, including preservation of archival records, shelving of bound volumes and disaster preparedness and response. Website: http://www.archives.gov/

The Smithsonian Center for Materials Research and Education (SCMRE) specializes in research and education in conservation and scientific studies of collection materials. Website: http://www.si.edu/scmre/

U.S. Department of Labor's Occupational Safety & Health Administration's (OSHA) mission is to assure the safety and health of America's workers by setting and enforcing standards; providing training, outreach, and education; establishing partnerships; and encouraging continual improvement in workplace safety and health. Website: http://www.osha.gov/html/a-z-index.html

The U.S. Department of Health and Human Service's Agency for Toxic Substances and Disease Registry (ATSDR) Office of Tribal Affairs (OTA) was established in 1999 in response to tribal requests. The OTA's mission is to support ATSDR in developing policies, procedures, funding, and research that address the environmental health needs of American Indian and Alaska Native populations Website: http://www.atsdr.cdc.gov/tribal/

Other U.S. Government Agencies

Centers for Disease Control - Website: http://www.cdc.gov/ncidod/diseases/hanta/hps_stc/stc_clean.htm
National Institutes of Health - Website: http://www.niehs.nih.gov/airborne/prevent/mold.html
Environmental Protection Agency – Website: http://www.epa.gov/oppts/asstadmn.htm
Food and Drug Administration – Website: http://www.fda.gov/
National Institute for Occupational Safety and Health – Website: www.cdc.gov/niosh/homepage.html
Occupational Safety and Health Administration – Website: www.osha.gov/

Chapter Notes: "What Is a Repository?"

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Bibliography for "Electronic Language Repositories"

Almasude, Amar. 1999. "The New Mass Media and the Shaping of Amazigh Identity." Revitalizing Indigenous Languages, edited by Jon Reyhner, Gina Cantoni, Robert N. St. Clair, and Evangeline Parsons Yazzie. Flagstaff, Arizona: Northern Arizona University.

American Indian Studies Research Institute. http://www.indiana.edu/~aisri/the_institute/index.html. Accessed on October 22, 2004.

Assembly of Alaska Native Educators. Anchorage Alaska, 2001. Guidelines for Strengthening Indigenous Languages. Fairbanks, Alaska: Alaska Native Knowledge Network.

Barnhardt, Ray and Kawagley, Oscar. 2005. "Indigenous Knowledge Systems/Alaska Native Ways of Knowing." Article accepted for publication in *Anthropology and Education Quarterly*, Winter.

Davis, Thomas and Trebian, Mark. 2001. "Shaping the Destiny of Native American People by Ending the Digital Divide." *Educause Review*. Vol 31, No 1, January/February, pp. 38-46.

First Peoples' Cultural Foundation. 2004. "First Voices, Language Archives Celebrating World Indigenous Cultures." http://www.firstvoices.ca/scripts/WebObjects.exe/FirstVoices.woa/wa/file Accessed on November 30, 2004.

Fishman, Joshua. 1991. Reversing language Shift: Theory and Practice of Assistance to Threatened Languages. Clevedon, England: Multilingual Matters.

Fishman, Joshua. 1996. "What Do You Do When You Lose Your Language?" *Stabilizing Indigenous Languages*. G. Cantoni, Ed. Flagstaff, Arizona: Center for Excellence in Education, Northern Arizona University.

Hunter, Jane, Koopman, Bevan, and Sledge, Jane. September 2002. "Software Tools for Indigenous Knowledge Management." Queensland, Australia: http://archive.dstc.edu.au/IRM_project/software_paper/IKM_software.html. Accessed October 26, 2004.

Indigenous Language Institute. 2000-2004. "Lenape Lessons Now Available on CD-ROM." http://www.indigenous-language.org/sharing/index.php. Accessed on October 25-26, 2004.

Hunter, Jane, Schroeter, R., Koopman, Bevan, Henderson, M. June 10, 2004. "Using the Grid to Build Bridges between Museums and Indigenous Communities", GGF-11, Semantic Grid Applications Workshop, Homolulu.

Jupermedia Corporation. 2004. "Webopedia, The only online dictionary and search engine you need for computer and Internet technology definitions. http://www.webopedia.com/. Accessed on October 26, 2004.

Khlief, B. 1991. "The place of Arabic in identity maintenance of Moroccans in The Netherlands: An exploratory study of some school textbooks." In K. Jaspaert & S. Kroon (Eds.), Ethnic Minority Languages And Education. Amsterdam: Swets & Zeitlinger.

Kuamo'o, Hale. 2004. "Ulukau, the Hawaiian Electronic Library." Hilo, Hawaii: College of Hawaiian Language and the Native Hawaiian Library, Alu Like, Inc. http://ulukau.org/english.php. Accessed on December 1, 2004.

Oral History Association. 2002. "Oral History Association." Accessed December 2, 2004: http://omega.dickinson.edu/organizations/oha/.

Parks, Douglas. "Genesis of the Project." 1999. *Revitalizing Indigenous Languages*, edited by Jon Reyhner, Gina Cantoni, Robert N. St. Clair, and Evangeline Parsons Yazzie (pp. 59-83). Flagstaff, AZ: Northern Arizona University.

Reyhner, Jon, Cantoni, Gina, St. Clair, Robert N., and Yazzie, Evangeline. 1999. Flagstaff, Arizona: Northern Arizona University.

Stauffer, Bob. 7/23/04. "Notes on the Hawaiian electronic library project for Suzan." Correspondence between Bob Stauffer and Suzan Harjo.

Welker, Glenn and Zepeda, Ophelia. 2004. "Tohono O'odham (Papago) Literature." http://www.indigenouspeople.net/papago.htm. Accessed October 29, 2004.

Endnotes for Building a Physical Repository

[1] http://www.usdoj.gov/crt/ada/adahom1.htm. Last accessed 11/22/04.

[i] Parks, Douglas. "Genesis of the Project." *Revitalizing Indigenous Languages*, edited by Jon Reyhner, Gina Cantoni, Robert N. St. Clair, and Evangeline Parsons Yazzie (pp. 59-83). Flagstaff, AZ: Northern Arizona University. Copyright 1999 by Northern Arizona University.

[ii] The Dublin Core is a cross-disciplinary effort to define elements that help in searching for information on the Internet. The Dublin Core Element Set comprises fifteen elements which together capture a representation of essential descriptions of resources available through libraries of documents and text on the Internet. Usually the Dublin Core is used in relationship to metadatabases. Metadata is "data about

data, or information known about an image in order to provide access to the image. Usually includes information about the intellectual content of an image, digital representation data, and security or rights management information."[ii] Internet enabled databases are databases designed to function effectively in Internet environments.

[iii] Indigenous Language Institute. 2000-2004. "Lenape Lessons Now Available on CD-ROM." http://www.indigenous-language.org/sharing/index.php. Accessed on October 25-26, 2004.

[iv] This Internet site can be accessed at http://ulukau.org/english.php. Accessed on October 22, 2004.

[v] Stauffer, Bob. 7/23/04. "Notes on the Hawaiian electronic library project for Suzan." Correspondence between Bob Stauffer and Suzan Harjo.

[vi] American Indian Studies Research Institute. Accessed on October 22, 2004. http://www.indiana.edu/~aisri/the_institute/index.html.

[vii] American Indian Studies Research Institute. http://www.indiana.edu/~aisri/projects/idd/idd.html. Accessed on October 22, 2004.

[viii] To parse a sentence is to divide a sentence into its elements, pointing out the parts of speech and their relationship to each other. It is to describe or analyze a sentence's grammar.

[ix] In linguistics a gloss is a shining, or a clarifying, or a highlighting of a word or phrase.

[x] American Indian Studies Research Institute Accessed on October 22, 2004.. http://www.indiana.edu/~aisri/projects/atp/atp.html.

[xi] American Indian Studies Research Institute. Accessed on October 22, 2004. http://www.indiana.edu/~aisri/cdel_sound_lab/index.html.

[xii] First Voices Project, http://www.firstvoices.com, accessed October 26, 2004.

[xiii] Hunter, Jane, Koopman, Bevan, and Sledge, Jane. September 2002. "Software Tools for Indigenous Knowledge Management." http://archive.dstc.edu.au/IRM_project/software_paper/IKM_software.html. Accessed October 26, 2004.

[xiv] Sybase. October 28, 2003. "Distributed Database." searchDatabase.com Definitions. http://searchdatabase.techtarget.com/sDefinition/0,,sid13_gci933754,00.html. Accessed October 26, 2004.

[xv] Hunter, Koopman, and Sledge. October 26, 2004.

[xvi] Hunter, Koopman, and Sledge. October 26, 2004.

[xvii] Fishman, Joshua. 1996. "What Do You Do When You Lose Your Language?" *Stabilizing Indigenous Languages*. G. Cantoni, Ed. Flagstaff, AZ: Center for Excellence in Education, Northern Arizona University.

[xviii] Khlief, B. 1991. "The place of Arabic in identity maintenance of Moroccans in The Netherlands: An exploratory study of some school textbooks." In K. Jaspaert & S. Kroon (Eds.), Ethnic Minority Languages And Education. Amsterdam: Swets & Zeitlinger.

[xix] *Almasude, Amar. 1999. "The New Mass Media and the Shaping of Amazigh Identity." Revitalizing Indigenous Languages*, edited by Jon Reyhner, Gina Cantoni, Robert N. St. Clair, and Evangeline Parsons Yazzie. Flagstaff, AZ: Northern Arizona University.

[xx] "Tohono O'odham (Papago) Literature. June 9, 2004. http://www.indigenouspeople.net/papago.htm. Accessed October 29, 2004.

[xxi] http://www.usdoj.gov/crt/ada/adahom1.htm. Last accessed 11/22/04.

Endnotes for Hazardous Materials and Contaminated Objects in Archive and Museum Collections

[xxii] http://www.cdc.gov/nasd/docs/d001001-d001100/d001027/d001027.pdf Last accessed 12/18/04.

[xxiii] National Park Service, Conserve O Gram, Number 2/3, Arsenic Health and Safety Update, September 2000.

[xxiv] Health and Human Services, Agency for Toxic Substances and Disease Registry http://www.atsdr.cdc.gov/tfacts2.html Last accessed 12/21/04.

[xxv] National Park Service, Curatorial Safety, January 2003, "Have Your Curatorial Areas Been Tested for Radon?"

[xxvi] National Park Service, Conserve O Gram, No. 2/10, August 1998. "Hazardous Materials In Your Collection".

[xxvii] www.mgfnsw.org.au/resources/Research/hazardousmuseum.php. Last accessed 11/17/04.

[xxviii] http://www.nedcc.org.plam3/tleaf311.htm Last accessed 12/20/04.

[xxix] http://www.palimpest.standford.edu/byauth/jessup/ipm.html Last accessed 12/20/04.

[xxxi] National Park Service, Conserve O Gram, No. 3/9, May 1999. “Anoxic Microenvironments: A Treatment for Pest Control”.
[xxxii] National Park Service, Conserve O Gram, No. 3/8, August 1998, “Controlling Insect Pests: Alternatives to Pesticides”.
[xxxiii] Abbey Newsletter, Vol. 18, No. 6, October 1994. “Mold as a Threat to Human Health”.
[xxxiv] Abbey Newsletter, Vol. 26, No. 6, October 2003. “Chlorine Dioxide: A Treatment for Mold In Libraries”.
[xxxv] http://www.cdc.gov/ncidod/diseases/hanta/hps_stc/stc_spot.htm. Last accessed 12/07/04.