Chapter 5

Preservation Information

Contents

Table

Chapter 5
Preservation Information

INTRODUCTION

The preservation of prehistoric and historic cultural resources depends substantially on the use of historical records and technical information that exist in a variety of forms and are stored and maintained in a variety of places. Decisions concerning the restoration and maintenance of historic landscapes are highly dependent on historical maps and landscape designs. Historians and architectural historians depend on drawings, historic photographs, and written records for their research. Archaeologists may find ethnologies, historic maps, or even insurance records[1] useful in their investigations. The Library of Congress (LOC); The National Archives and Records Administration (NARA); The National Park Service (NPS); The Smithsonian Institution; The National Technical Information Service; and other Federal, State, and local agencies acquire and maintain a wide variety of information on prehistoric and historic sites, structures, and landscapes.

One of the most critical problems confronting historic preservation involves the storage, retrieval, and dissemination of technical and other information on prehistoric and historic sites, structures, and landscapes (table 17). How all of these varied materials are conserved and made available for research is of vital importance.

Much of the information of interest to historic preservationists is housed in Federal agencies. Out-of-date Federal records, according to the various statutes and public laws[2] affecting the disposition of Federal agency records, are accessioned by NARA. However, the reality of records management by the Federal Government does not necessarily reflect adherence to these laws. In another context, it was noted that, "the United States is in danger of losing its memory."[3] To help prevent the loss of preservation's memory, agencies should make every effort to keep track of their active records and to transfer their retired records in a timely manner to the National Archives.

Table 17.—Preservation information

- books—histories, novels, poems, etc.
- charts
- catalogs
- newspapers, journals, magazines
- construction/repair/maintenance reports
- field records
- documents—letters, diaries, administrative correspondence, tax records, insurance records, deeds, wills, etc.
- architectural/landscape specifications/drawings/blueprints
- pattern books
- electronic and video recordings.
- optical disks
- films
- maps
- plats
- photographs—aerial, terrestrial
- machine-readable records—tapes, computer disks, microfiche, phonographs
- analog/digital remote sensing data
- artwork-paintings, drawings, prints
- recorded and sheet music

SOURCE: Office of Technology Assessment

[1] See William M. Kelso, "Mulberry Row: Slave Life at Thomas Jefferson's Monticello," *Archaeology* 39, 1986, pp. 28-35, for an account of the use of historical records in an archaeological investigation. See also Theodore J. Karamanski, "Logging, History, and the National Forests: A Case Study of Cultural Resource Management, " *Public Historian 7, 1985,* pp. 27-40.

[2] 44 U.S. c. 2101-2114, 2901-2909, 3103-3107, 3301-33 14; U.S.C. 2071; Public Law 95-416 and Public Law 95-440.

[3] *Report of the Committee on the Records of Government,* Washington, DC, March 1985.

TECHNOLOGIES FOR ARCHIVAL RESEARCH

Once the records are transferred, however, the most important point to understand about archival records is that in many cases they are not organized by subject like library books. Government records housed in the NARA system (which includes regional branches throughout the coun-

try) are organized by the principle of provenance, which means that records created by one government unit are not mixed with others. For example, the files of materials created by the Bureau of Indian Affairs are not mixed with the records originated by the War Relocation Authority, even if the subject (Indian removals during World War II) is the same.

Provenance, however, may be supplemented by a subject system because of technological developments. That happens, for example, in national networks in which any number of institutions (as diverse as LOC and NARA, and the universities Stanford, Harvard, Cornell, Wisconsin, and Michigan on one system) add descriptions of their holdings with any number of keywords. These can combine books and archival records. As archivists rethink their collections for purposes of adding the information to these databases, they are also rethinking descriptive practices and supplementing the principle of provenance. In addition to the collections of documents in archives and manuscripts in libraries, such other materials as collections of maps, films, photographs, and architectural drawings can be described through this method. This can provide a finding aid to make a rapid scan of the content and location of the collections at the start of a project.

Developments in optical character readers have potential for archival use. One, tested recently using the 19th century ledgers of the Bureau of Indian Affairs, can recognize handwriting. It was apparently 92 percent accurate before corrections were made.[4] Optical disk storage gives a clearer, higher resolution version of materials than can microfilm technology, and it is faster and more efficient to use and to store than current forms.

In addition to developing more efficient ways to locate and house research materials for individual projects, technology allows access to a wider range of materials. Some projects have developed databases such as the Documentary Relations of the Southwest (DRSW) project based at the Arizona State Museum in Tucson. With documents running chronologically from 1520 to *1820,* and a geographical area defined as approximating the boundaries of colonial New Spain, the research tools created include a master index and separate biographical and geographic files. BIOFILE Southwest consists of a master list and additional indexes of relatives and household members; occupations and titles; and a BIODEX which indexes over 44,000 names culled from secondary sources. While the collection is not yet definitive and comprehensive, it makes research in materials relating to colonial New Spain easier.

In addition, some projects are considering ways to use location information. With a set of coordinates that pertain to a site, or a region, or other physical location, the researcher can receive a print-out of library and archival materials related to that physical spot. GEOFILE Southwest is an alphabetical gazeteer of almost 65,000 Southwest place names that is correlated with three separate geographical references. Research for projects that cover a wide geographical area would clearly be more practical with this means of accessing information.

The need to establish intellectual control over materials crucial to research projects has led to developments of importance to preservationists. Archivists are developing record exchange formats to be used for individual projects to standardize (as far as that is possible) the documentary research for resource investigations.

Such developments make the process of organizing a research project more efficient. Being able to handle information electronically has also changed the materials to be used for research. For example, the Afro-American Communities Project housed in the Smithsonian Institution's National Museum of American History has used varied sorts of local civic, economic and religious records, as well as newspapers, private writings, and national surveys such as census records to trace the migration, living, and working patterns of free black people before the Civil War in major American cities like Boston, Cincinnati, and San Francisco. Combined with archaeological information, the project explores internal household activities such as food consumption. Furniture inventories and similar lists of household goods help to re-create a picture of everyday life in a complex black community.

[4]Thomas E. Weir, Jr., National Archives and Records Administration, personal communication, 1983.

Issues

Storage of databases that arise from individual projects.—It will be important to develop some means of keeping track of these databases, like the "grey literature" of archaeology, because such a record might prevent the re-doing of research. On the other hand, the materials so accumulated might be useful only rarely.

Only a few institutions may receive the bulk of research attention. -The possibility that institutions with the money to be involved in these systems may receive the bulk of the research attention because their holdings are more accessible and thus easier to use than those not yet on the system, could discriminate against groups whose historical records lie in smaller depositories.

It **will be important to** develop means of paying for the development of finding aids and databases.–Developing the finding aids and databanks from the archives and manuscript depositories is labor intensive. It will require the development of new sources of funding.

TECHNOLOGIES FOR PRESERVATION INFORMATION

This section identifies and discusses several important technologies or classes of technologies related to preservation information.

Optical Disk Systems

Optical disk systems offer a number of features well suited for storing, retrieving and manipulating preservation information. They are capable of storing audio, full motion video, still images, and text. Data for microcomputers can now be stored digitally on optical disks; such disks can store up to 1 billion bytes of data. Disks can be quickly and easily searched; any information on a single disk can be recovered within 1 second. Optical disk technology also promises to lower the cost of recording and accessing data dramatically. However, it raises important questions concerning longevity (see section below "Longevity of records stored on new technologies").

For example, the Connecticut State Department of Transportation recently recorded images of much of its highway system on laser disks. With merely 15 disks the Department has replaced an entire roomful of film cabinets. s

The Massachusetts Institute of Technology has pioneered the use of the technology for surveying towns.[6] With interactive optical disks they have:

- recorded scenes of the same building in different seasons, along with contemporary and historic views, designing a sequence that allows the investigator to pursue various levels of research detail and, in effect, enter a building to study its functions;
- allowed the investigator to switch back and forth between still and live action images; and
- allowed the investigator to move down a street and choose different routes with no perceptible interruption in the flow of images.

This technology is promising not only for survey but training as well. The Department of Defense (DOD) uses this new technology to teach electrical and mechanical processes too complex to be explained via the typical training manual, such as those for new tanks or aircraft. A mixture of text, still, and action imagery allows students, through a series of procedures, to learn the consequences of both wrong and right decisions.

[5]John Myers, Georgia Institute of Technology, personal communication, 1986.

[6]Andrew Lippman, **"An Application of the Optical Videodisc to Computer Graph ics,"** *Proceedings of the SIGGRAPH '80 Seventh Annual Conference on Computer Graphics and Interactive Techniques,* Seattle, WA, July 1980.

For the purposes of historic preservation, an optical disk training package on cleaning building exteriors could present a menu containing certain treatment selections. The program could then demonstrate the results of those selections. The effects of destructive applications such as sand blasting or inappropriate chemical cleaning could be revealed and emphasized immediately through a time-lapse sequence, showing how a building would look after 1 year, 5 years, etc.

An optical disk the size of a long-playing record holds approximately 54,000 single images on each side; the master disk costs around $2,500 per side to make. Each disk can be copied for only about $15.OO (+/- 20 percent) and can thus be widely distributed. Although optical disks have markedly decreased the time consumed in accessing information, overall costs are still high. Mastering a disk does not include the extensive labor required to accumulate the images for the disk, nor any supportive text. It also does not include disk preparation, labeling, or cataloging. These costs can be expected to decrease rapidly as production volume increases.

Computers

Computers have become an important part of historical research. The proliferation of minicomputers and microcomputers has made it possible for the preservation community to record, store, retrieve, and manipulate a wide variety of data on prehistoric and historic sites, structures, and landscapes. Although computer technology is still undergoing rapid change, it has already become more powerful, less expensive, and available to more people in the workplace and at home than it was just a few years ago. Yet, preservationists have only recently begun to exploit computer technology in acquiring and disseminating information. Primary constraints to widespread use by preservation professionals include high costs of hardware and data entry, which is extremely time-consuming and labor-intensive; lack of standards for documenting historic preservation information; inadequate coordination among Federal, State, and local agencies in harnessing computer technology; and lack of familiarity with the technology itself.

Networks

Preservation professionals in the universities tend to make little use of the available university mainframe networks such as BITNET and ARPANET. Yet, they can be sources of free information and software. Few preservation professionals are mainframe computer users and the network systems are relatively new.

For micro computer users, commercial information services such as CompuServe and Dialog are available. However, only a few of the major publications in the several preservation disciplines are available in commercial bibliographic data bases.

Expert Systems

Technological development has not only increased the computer's capacity for receiving, storing, and presenting enormous amounts of data; it has also resulted in the application of expert or knowledge-based systems. Expert systems are a subset of " 'artificial intelligence, ' a term that has historically been applied to a wide variety of research areas that, roughly speaking, are concerned with extending the ability of the computer to do tasks that resemble those performed by human beings."[7] These systems are developed to aid decisionmaking in certain kinds of practical tasks such as diagnosing diseases, repairing mechanical systems, or analyzing molecular structure.

Expert systems store the inferences governing rules, steps, or procedures which model or describe the way experts approach tasks. Expert systems interact with users to solve problems by asking a series of questions and suggesting possible courses of action. Although currently expert systems can be designed for use within rather narrow specialties, they offer greater promise than any automated technology thus far for giving meaning to stored information. **This capability could be very important in historic preservation because of the scarcity of knowledge and the**

[7] See U.S. Congress, Office of Technology Assessment, *Information Technology: R&D Critical Trends and issues,* OTA-CIT-268 (Washington, DC: U.S. Government Printing Office, February 1985).

intense demand for information, decisions, and judgments in dealing with materials and structures.[8] Expert systems can also be designed for archival records retrieval and may eventually change the way preservation professionals collect and process data.

Such systems may be useful for problems that are extremely well-defined, or bounded, such as the choices of specific technologies for conserving stone or wood. However, most other research problems in preservation are so difficult to limit that they are unlikely to yield to expert systems.

[8] See NBSIR 85-3186, *Development of Durcon, An Expert System for Durable Concrete: Parr 1,* James R. Clifton, Bhalchandra C. Oltikar, and Steven K. Johnson, U.S. Department of Commerce, National Bureau of Standards, Gaithersburg, MD, July 1985. This is the first of a series of four progress reports to be completed on recommendations for constituents for durable concrete. The reports will address the problems (freeze-thaw, sulphate effects, reinforcing steel corrosion, and cement/aggregate interactions) associated with concrete, the most widely used man-made construction material.

DATABASES

One of the most significant advances of the last decade in the development of databases is the invention and proliferation of inexpensive microcomputers and their associated software. As they have become increasingly more capable and cheaper to acquire, individuals and small institutions can develop their own powerful databases, and communicate, by telephone and modem, with other databases around the world.

The generation of databases is one of the most critical aspects of computer use for information storage and retrieval. The simplest and most important database for all intellectual activity is bibliographic. Therefore, it is necessary to develop as complete a bibliographic database as possible. Databases are crucial to the efficient use of information. The following sections list some of the important preservation databases known to OTA. They are representative and not meant to be inclusive.

Federal Preservation Databases

For the most part the regional offices of the various land managing agencies have traditionally operated with great autonomy. This autonomy has resulted in a fragmented approach to applying computer technology to historic preservation information. Regional offices would benefit greatly from compatible hardware, software, and standardized formats.

The National park Service.-The National Register of Historic Places's National Register information System has been operational since May 1984. It contains information on over 45,000 prehistoric and historic structures, objects, and sites in the United States, both listed and determined eligible for listing.

The Computers Committee of the National Conference of State Historic Preservation Officers has, since 1983, attempted to standardize certain elements of the State-Federal preservation program. The committee's effort will link individual State computer databases with the National Register Information System and aid those preservation offices in the early phases of computerization. This initiative will greatly facilitate, with the adoption of common data fields, each preservation office's ability to engage in information exchanges and cooperative studies. In addition, it will give greater uniformity to the year-end reports the State offices must submit to NPS in order to receive Federal historic preservation funds.

National *Archeological Database.* –This database will store data on archaeological contract work. Most of this is composed of the so-called "grey" literature and includes approximately 150,000 contract reports on archaeological survey, salvage, and other work.

A proposed Database of Databases.–NPS is developing an index of cultural program databases within its Washington, DC, office. The base will provide data fields and descriptions. NPS will make its databases available through the State preservation offices to any legitimate user. NPS will therefore depend on State preservation offices to screen potential users.

Box B.—The National Register of Historic Places, U.S. Department of the Interior National Park Service

The National Register of Historic Places is the official list of the Nation's cultural resources worthy of preservation. Authorized under the National Historic Preservation Act of 1966, the National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect our historic and archaeological resources. The National Register is administered by the National Park Service under the Secretary of the Interior. Properties listed in the National Register include districts, sites, buildings, structures and objects that are significant in American history, architecture, archaeology, engineering, and culture. These resources contribute to an understanding of the historical and cultural foundations of the Nation.

The National Register includes:

- all historic areas in the National Park System;
- National Historic Landmarks which have been designated by the Secretary of the Interior for their significance to all Americans; and
- properties significant to the Nation, State, or community which have been nominated by the States, Federal agencies and others and have been approved by the National Park Service.

The National Register of Historic Places

Listing in the National Register has the following results which assist in preserving historic properties:

- Recognition that a property is of significance to the Nation, the State or the community.
- Consideration in the planning for Federal or federally assisted projects.
- Eligibility for Federal tax benefits.
- Consideration in the decision to issue a surface coal mining permit.
- Qualification for Federal assistance for historic preservation, when funds are available.

National Register properties are distinguished by having been documented and evaluated according to uniform standards. The Secretary of the Interior's National Register criteria for evaluation and documentation standards are used by every State and Territory and by Federal agencies to identify important historic and archaeological properties worthy of preservation and consideration in making planning and development decisions.

The National Register program provides Federal, State, and local governments and the general public the following:

- National recognition of the value of historic properties individually and collectively to the Nation.
- Eligibility for Federal tax incentives and other preservation assistance.
- Assistance in cultural resource planning.

SOURCE: National Park Service

The Cultural Resources Management Bibliography ***(CRBIB)*** *and The List of* Classfied Structures (LCS).–Both databases contain evaluated information concerning properties under NPS management. Significant archaeological sites as well as prehistoric and historic structures are listed. The first base contains 23,000 entries, the second, 7,000. These computerized lists are intended as planning aids to National Park Service managers and cultural resource professionals throughout the system and as information sources to the general public.

The List of Classified Structures contains data relative to each property's name, level of significance (national, State, or local), National Register status, location, type or function, material composition, age, physical condition, level of conservation and maintenance required, level of documentation, kinds and severity of impacts and stresses, etc.[9]

[9] "User Manual for Cultural Resource Databases, List of Classified Structures Cultural Resources Management Bibliography," Alicia Weber (compiler), Park Historic Architecture Division, August 1986 (draft).

The Cultural Resources Management Bibliography contains comprehensive information relative to the kinds of publication, report, or study carried out on each property.

The Historic American Building Survey/Historic American Engineering Record *(HABS/HAER) Computerization* Program.–Data on historic sites and structures delineated through the National Park Service's Historic American Buildings Survey (HABS) and Historic American Engineering Record (HAER) are available via computer from both the NPS and the LOC. Measured drawings, photographs and supporting research information compiled by HABS from 1933 to 1982 and HAER from 1969 to 1985 cover thousands of properties-over 16,000 buildings and 1,200 sites of significance in the Nation's industrial and technological development. Entries are listed alphabetically by State code and numerically by county code. They provide property or site location, HABS or HAER number, quantities of drawings, photographs, and supporting research information. In addition, entries indicate where all documentation is housed, either permanently within LOC or temporarily within NPS, in preparation for eventual transmittal to the Library. The computer index is accessible at terminals located within the Library and the HABS/HAER office within NPS.

The Census of Treated Historic Masonry Buildings to Maintain Long-Term Records on Treatments to Historic Buildings.—With the Center for Architectural Conservation, Georgia Institute of Technology, the Service is developing microcomputer programs in order to create accessible microcomputer databases on such subjects as Laboratories, products, training, organizations, special collections, consultants, and print and nonprint material.

The Intermountain Antiquities Computer System (IMACS).–Begun 11 years ago by the U.S. Forest Service, this cooperative cultural resource data management system serves its Intermountain Region, one of nine within the system, as well as the Bureau of Land Management, and the State Historic Preservation Offices of Utah, Nevada, Idaho, and Wyoming. It contains information on all classes of cultural resources. It provides locational and conditional information on structures and archaeological sites, their age, type or function, cultural affiliation, and the environmental attributes of the areas within which they are situated. It is accessible accessible not only via mainframe but mini- and micro-computer systems and provides data not only on public lands but private holdings as well.

The Library of Congress (LOC)

The National Union Index to Architectural Records.–This database can be accessed by the name of the architectural firm; partner; name or location of a building or structure; as well as by building type. Also, LOC's Optical Disk Pilot Program represents an attempt to identify costs, benefits, strengths, and shortcomings associated with this technology for storage and retrieval of the Library's collections. The technology holds great promise in addressing problems concerned with access to fragile, rare, and deteriorating collections materials.

The database for the National Union Index to Architectural Records is maintained by Cooperative Preservation of Architectural Records (COPAR). COPAR was established to encourage the collection, maintenance, and interpretation of records threatened with loss or destruction, and to serve as a national and international clearinghouse of information on the location, preservation, and cataloging of these documents. To achieve these goals CO PAR offers guidelines for the establishment of local and State groups, provides technical assistance and information to professionals and the general public. In addition, COPAR maintains the data for a national union catalog of architectural records, and it accepts and provides information about them.

Nonfederal Databases

State Databases.–All States via the State Historic Preservation Offices maintain the most systematic lists on archaeological sites and prehistoric and historic structures within the States and Territories. OTA queried each State Historic *Pres*ervation Officer, requesting descriptions of new technologies being applied to locating, analyzing, and protecting their cultural resources. The letters specifically requested information on historic preservation computer database develop-

ment and whether the SHPOs take part in other databases on the National or State level. Sixteen States responded to OTA's inquiry. Replies revealed that some States have experienced easier access to the technology than others and have, therefore, made more progress in entering locational and descriptive information on their prehistoric and historic structures and archaeological sites. For the most part, the State Historic Preservation Offices do not take part in other State or in National databases, but look forward to gaining access to the National Register information System. On-line access to the National Register Information System will begin in 1987 on a trial basis.

The University of Maryland's Architecture and Engineering Performance Information Center.– It has started to track structural failures in buildings. Although not specifically preservation oriented, it might serve as a model for preservation or contain useful information on reasons for failures in historic buildings.

The Getty Museum.–As part of its program to develop an art and architectural information thesaurus, the Getty Museum is attempting to standardize some of the language used in computer programs. At present, the research and architecture sections are the most complete, but not yet available. Over 9,000 entries are specific to architecture. Another 4,000 entries are terms shared by the fine and decorative arts. The Getty Museum is also incorporating the database compiled by the Canadian Conservation Institute.

The Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM). –This database, residing in Rome, considered the most complete bibliographic database in the preservation field, is now on a mainframe computer and also available in printed form. ICCROM has embarked on a project to convert it to micro computer for easier access. At present, it is virtually inaccessible by outside computers.

The National Association of Corrosion Engineers/National Bureau of Standards.–This corrosion database is a collaborative program to collect, evaluate, and disseminate corrosion data. It includes a user-friendly computer database of evaluated data on the rate and stability of metallic materials.

Underwater Archaeological Databases

Of all cultural resources areas, underwater and maritime materials are the least inventoried and stored in computer. The Texas Antiquities Commission has begun a computerized shipwreck reference file, which could serve as a model to States that have not yet begun their own maritime and submerged sites surveys. It is based on information culled from both historic and contemporary sources such as maps and field reports. The file represents an effort to determine more effectively where likely unidentified wrecks might be situated and to aid research. Not all wrecks indicated have been located because not all historic references are totally reliable. However, this resource file allows the State to demonstrate the possible existence of a historic shipwreck within a particular geographical area. The file often helps justify the employment of nondestructive remote sensing surveys before a potentially destructive activity, such as dredging or harbor facility expansion begins.

Since 1972, over 1,000 shipwrecks have been listed, of which approximately one-half have been determined historic. Recently the Commission elected to augment the file with maps and navigation charts. The States, because they have not made much headway in applying computer technology to maritime inventories, can initially achieve a substantial degree of consistency by working together in developing compatible databases and efficient computer networks.[10]

Underwater archaeologists and maritime preservationists could make excellent use of computer technologies to establish as quickly as possible a mechanism that permits the ongoing revision of statistics on the condition of all classes of known submerged cultural resources. Such statistics can dramatically and meaningfully convey to the public a sense of the relative health of such resources. At present, there is no broad-based, consistent quantification of the rate of loss of submerged cultural resources.

[10] **J. Barto** Arnold, III, "Underwater Cultural Resource Management: The Computerized Shipwreck Reference File, " *Underwater Archaeology: The Proceedings of the the Eleventh Conference on Underwater Archaeology,* Calvin R. Cummings (cd.) (San Marine, CA: Fathom Eight, 1982), pp. 85-95.

Landscape Databases

The preservation community should support efforts of the Library of Congress; the National Archives; and other Federal, State, and local archives to identify and maintain records of landscapes because, **at present, no national landscapes database exists. A first important step will be to create a database listing deposits of records and collections throughout the country.** The following databases contain some information about prehistoric and historic landscapes.

The Library of Congress.– Its National Union Index to Architectural Records (see above) contains information about landscapes.

The National park Service (BIBSCAPE).–This is a database of all the landscapes within the national parks. It is separate from the LIST OF CLASSIFIED STRUCTURES. The Service is also employing interns to examine its published documents for substantial references to landscapes. This effort has yielded 200 items out of 6,000 publications.

ISSUES

1. The problems of preservation faced by various archives often begin in the field, when research and other records are created. "Most field researchers lack a basic knowledge of the archival principles and techniques that contribute to record longevity."[11] Many preservationists fail to maintain records of their fieldwork, believing that a well-documented published paper will suffice. Yet, generally, the best sources of original data are the field records themselves. Even records that have been carefully stored may be lost because they have been created on media that have extremely short lifetimes. Paper, inks, magnetic tape, film are all subject to degradation. **In order to improve the ability of archives to store and retrieve records, it will be important for preservationists working in the field to be aware of the actions they can take to create and maintain long-term records.**

2. A number of impediments exist to the application of computer technology to historic preservation information needs:

- **lack of communication and coordination among database designers, leading to duplication of effort,**
- **lack of standardization in data systems and language,**
- **lack of Federal level leadership and commitment regarding the improvement of preservation data management,**
- **lack of computer networks for historic preservation, and**
- ***costs.***

Although computers have reduced the costs of storing and retrieving information, putting records on computers remains relatively expensive because it is generally labor-intensive. Volunteers and student interns can be helpful in entering data on computers. However, the help of volunteers upon which museums and other public institutions depend is not entirely risk free. Volunteers must acquire adequate training to be effective.

Training volunteers takes staff time from other important projects. It is important to interview individuals closely, train them carefully, and thus ensure that they perform their tasks properly.

For certain applications, an automatic optical scanner for transferring printed text to a computer database could lower certain labor costs, once the capital cost of the equipment is borne.

3. **Standardized formats are essential for convenient and reliable access to databases. Yet, ex**cept in the world of research libraries, there has been little or no attempt to standardize or strictly define the various data elements or to create compatible formats and terms that would provide common access to documentation for individual

[11] Mary Anne Kenworthy, Eleanor M. King, Mary Elizbeth Ruwell, and Trudy Van Houten, *Preserving Field Records* (Philadelphia, PA: The University Museum, University of Pennsylvania, 1985). Although this report was developed specifically for archaeologists and anthropologists, it contains much information of use to all preservation disciplines and offers practical advice for preserving field records.

sites or structures.[12] Included in such databases should be nonprint records stored on optical disks or other high capacity media.[13]

4. The preservation community needs a variety of information on preservation technologies and sources of expertise, delivered expeditiously. One of the most important needs related to technology is for critically evaluated information on the conservation, restoration, and maintenance of historic structures. A centrally maintained technical database could provide such information. Among other things, such a database could strengthen communication among preservation professionals and their counterparts in natural science and engineering fields. However, before delivery of such information is possible, it will be necessary to develop a nationally accepted format within which existing and new information can be incorporated. One step in that direction would be to create a centralized database that provides listings of specialized databases.

Databases should be made useful and accessible to developers, planners, and others outside the professional preservation community. In the absence of a national preservation information network, interested parties are confined to conducting their research within individual States. They should have access to a database that lists the relevant databases in the United States and other countries. However, certain privileged data, such as the locations of archaeological sites, should be accessible only on a limited basis.

One of the difficult problems faced in such an effort is the establishment of comparable search and store parameters. It is important to resolve the way a database answers specific sets of questions, yet allow it to remain compatible with others. The NCSHPO, for example, is facing this problem in attempting to achieve compatibility between the SHPOs' databases, of varied quality and completeness, and the database designed for the National Register of Historic Places. The Computers Committee has, thus far, completed a list of fields for rehabilitation tax credit databases, fields for bibliographies, and an overview of database design.

The same institutional structure (such as a Preservation Technology Board) that would strengthen communication among historic preservation professionals and their colleagues in the sciences (see *Chapter 2: Introduction* and *Chapter 7: Technology and Preservation Policy)* could play a coordinating role in identifying improvements in the various computer databases for studies of historic structures and other cultural resources.

The Library of Congress, along with the National Archives and Records Administration, and some university manuscript collections specialists, are working toward establishing a Nationwide database. However, they face potential problems relating to the development of common standards. The National Archives houses retired Federal records. It is not clear that Federal Agencies themselves are striving to achieve commonality in studies being done for the purposes of computer-based data storage and retrieval.

Although the goal of coordinating the voluminous amount of existing preservation information and creating a national database for historic preservation might be attractive for reasons of simplicity of research, a national database looks neither technically feasible nor affordable in the short run. Because the field is multi-disciplined and fragmented, it is not bound by one accepted set of terms.

There is a need to provide data to a variety of preservation practitioners–scholars, Federal managers, architects, scientists, and craftsmen. Therefore efforts might be better expended on the technically easier task of establishing a network of links and keys to tie multiple databases together.

Technologies for Conserving Records

Although the focus of this study is technologies for sites, structures, and landscapes, conserving historic records is an important facet of the preservation process. Assuring the availability of historic records will require finding appropriate methods to convert deteriorating paper, film, and other media to less ephemeral media.

[12] For instance, by name, geographic or geo-political location, Subject, date, or design history.

[13] The LOC Prints and Photographs Division, as part of LOC's Optical Disk Pilot Program, is storing thousands of images from several collections. See Joseph Price, "The Optical Disk Pilot Program at the Library of Congress," *Videodisc and Optical Disk, 4 (1984): 424-432.*

One potentially serious problem in the development and use of new data storage technologies, such as optical disks, is their long-term stability. First, the longevity of the recording media themselves is unknown .14 Second, because the technologies are changing fairly rapidly, in the future it may be difficult to find the equipment to "read" certain records made in the last 50 years. For example, only a few institutions maintain the devices to play back cylinder recordings made in the early part of the century. Yet recordings such as those in the American Folklife Center's "cylinder project" provide Native American music that is rarely sung today.

In the 1930s, LOC sponsored a major survey of the Architecture of the South, funded by the Carnegie Foundation. As it was to bean archival collection, they used the best safety film of the day from Kodak. However, in the 50 years since they were originally made, the photographs have faded and cracked. Recently, LOC spent $60,000 copying 8,000 8x1 O prints from the collection.

In addition to copying aging and threatened records, new technology can be used to make records previously inaccessible available. In order to make its collection of 25,000 glass plate negatives available to the public, LOC staff filmed them, reversed the polarity electronically, and recorded them on an optical disk. Now the Library is linking the optical disk to its automatic information retrieval system.

LOC staff have expressed concern over how long the optical disks and the disk players will last. Optical disk technology is still being improved and is, therefore, constantly changing. Most players now are built to National Television Standards. Yet, foreign standards are higher, and manufacturers are working on systems that will provide twice as many lines on a screen. Upgrading to higher standards later will entail greater expenditure.

Document Preservation and Copying

Architects and landscape architects frequently need to consult archival documents to understand the intent of a designer and to determine the integrity of a restoration. Yet, landscape architectural drawings are typically large (up to 25 feet long) and archivists have little experience with bulk conservation or copying of oversized documents. The sinks, drying racks, humidity chambers, and other specialized equipment for conserving large items are not readily available and must be custom designed and fabricated at great expense.

In general, architectural and landscape architectural plans were intended for short-term use and little or no thought was given to the possibility that they might later be placed in an archive. Many of the plans are, therefore, fragile. Many kinds of prints are often extremely faded and no known treatment exists to restore or stabilize them. The best that can be done is to copy them. However, because of the large format, poor image quality, or low contrast of the print, image enhancement may be required.

New document conservation technologies are needed.[15] Many letters contained in the Olmsted Association's correspondence file within the Library of Congress have faded so badly that they are nearly illegible without enhancement. Cost-effective methods should be found for copying, enhancing, and disseminating visual information. Preserving faded or outsized records is also labor-intensive and generally requires skilled personnel. It may be appropriate to set up regional centers specializing in the conservation of architectural drawings of structures and Landscapes.I[b]

[14] See *Preservation of Historical Records,* Committee on Preservation of Historical Records, National Materials Advisory Board, Commission on Engineering and Technical Systems, National Research Council (Washington, DC: National Academy Press, 1986). This study indicates that such materials as magnetic tape and disks are too perishable and unstable for archival purposes, with an estimated life span of no more than 20 years.

[15] For example, fumigation of records with ethylene oxide was standard practice until recently when it was discovered to be unsafe and the forbidden by Occupational Safety and Health Administration regulations. No satisfactory replacement has been found.

[16] See William H. Marquardt (cd.), "Regional Centers in Archaeology: Prospects and Problems, " *Missouri Archaeological Society, Research Series 14,* 1977, for a discussion of regional centers applied to archaeology.

Maintaining Noncomputerized Information

Most of the current archival material is composed of drawings, photographs (negatives and prints), phonograph recordings, magnetic tapes, and texts. The problem of loss and misfiling of drawings and other necessary noncomputerized research documentation has become severe. For example, many Federal agencies cannot recall files for reference on construction or maintenance projects completed years before because they have become lost within vast records storage areas. There are often no finding aids associated with document storage systems.

Many Federal agencies, over the last several years, have discarded a variety of housekeeping documents relating to properties under their stewardship. Thus, a valuable source of information on past maintenance, repair, and restoration schedules and procedures has been lost for reference to today's conservators and historians. All such new information should be carefully documented and kept until such time as it can be computerized.

A formidable amount of available information and original documentation, such as tax records within State and local governmental offices and business and insurance records from company and corporate archives, still must be organized and retained because they are extremely useful to historians. It is important for preservationists to apprise business and corporate leaders of the potential historical value of such holdings. In addition, archival photographs are valuable as records of past landforms in an area. They should be preserved on stable film.

Some progress has occurred lately in correcting the problem of misfiled and mislaid records within storage systems by the LOC Committee for the Preservation of Architectural Records, which has a computer locator and tracking system. Massachusetts and Pennsylvania have made some headway in developing state-wide computer-based architectural record systems.

Other Federal agencies, such as the National Park Service, have been attempting recently to "unbury" approximately 6,000 technical reports by microfilming or microfiching those completed before 1965 (after they have been critically evaluated as correct and up to date). Those reports completed since 1965 have been sent to the National Technical Information Service and are now available to the public.

Information on Underwater Archaeological Resources and Technology

The types of information relevant to underwater archaeology and maritime preservation are extremely varied and widely scattered throughout such sources as libraries, Federal, State, and local agencies, and oil, gas, and mineral industry survey inventories. A national repository within which new research findings could be incorporated, and which provided locational aids for sources of maritime and submerged cultural resource information, would aid underwater archaeological research and preservation immeasurably.

Underwater archaeologists have made relatively little use of the information filed with the Minerals Management Service. The Service requires all oil, gas, or mineral exploration companies to conduct archaeological surveys of any three-mile lease blocks they want to lease, The companies must bear all survey costs of, for example, shallow, sub-bottom seismic survey, magnetometric survey, and side-scan sonar survey. They must allow archaeologists to review all of the data generated and recommend to the companies where to and not to drill. The companies have processed a tremendous amount of data from off-shore areas, but archaeologists have synthesized very little of it for the purposes of underwater archaeological research.