

**MODERN
LIBRARY**
&
**INFORMATION
SCIENCE**

*for
Information Professionals
in Africa*

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Preservation and Conservation of Library Media Materials in University Library

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Introduction

This paper reviews the methods used in the preservation of library print and non print materials. It discusses the causes of damages and preventative measures to media materials. It also discusses specific methods used to elongated the life span of library materials like pre-disaster plan ,disaster policy, binding and digitising of print materials, and types of materials used in the process like adhesive ,leather among others for books and storage media such as the flash diskette and the CD-ROM and the Servers. Preservation in academic and research Libraries are not new concepts. However, with an increasing amount of digital content, organisations have to cope with new set of preservation issues. Media preservation is in its infancy worldwide and presents some different technological issues. Since the creation of digital media, over 200 different storage media have been inventing ranging from magnetic tape to CD-Rom. Each of these media presents a variety of their own preservation issues and also requires adverse range of technology which in many cases is no longer manufactured

Concepts

Preservation has been defined differently by different scholars. *The New International Webster's comprehensive Dictionary* (1996) defines preservation as a noun for the word *preserve* which means to keep in safety or to keep from destruction. Conserve, defend, guard, keep, maintain sustain among others are synonyms for preservation. Wikipedia (2009) defines 'preservation' as the branch of library and information science concerned with maintaining or restoring access to artefacts, documents different from conservation which refers to the treatment and repair of individual items to show decay or restore them to useable state. However, sometimes conservation is occasionally used interchangeable with preservation, particularly outside professional literature. Preservation is the process in which all actions are taken to check and reduce deterioration whereas conservation includes proper diagnosis of the decayed material, timely curative treatment and appropriate prevention from further decay (wikipedia2009).

The library is a social institution charged with the responsibility of disseminating knowledge to the people without discrimination. The stock of the libraries is the priceless heritage of mankind as they preserve facts, ideas, thoughts, accomplishments and evidence of human development in multifarious areas, ages and directions. The past records constitute a natural resources and are indispensable to the present generation as well as to the generations to come. Any loss to such materials is simply irreplaceable. Therefore preserving this intellectual, cultural heritage becomes not only the academic commitment but also the moral responsibility of the librarians' archivists and information scientists, who are in charge of these materials.

Proper dissemination of library materials can only take place if the documents or media materials are in good and useable condition. This calls for the proper preservation and conservation of the materials. The libraries that are charged with the preservation of these documentary heritages must discover the various causes of deterioration of the library print and non-print (media) materials and the possible way they can be preserved.

A lot of studies have been carried out on how to preserve paper based reading materials in the form of manuscripts, books, periodicals, paintings drawings, charges maps etc. The basic materials of the physical entity of these library materials are mostly organic in nature, and are therefore susceptible to natural decay and deterioration. In books, apart from paper the other materials used are board, cloth, leather, thread, and ink, adhesive among others. All these materials used are nutrition to some living organism. In point of fact, the library materials used for protection from factors of deterioration.

What are Media Materials?

Media materials also known of Audiovisual resources of materials, are collection of audiovisual resources in variety of formats in all fields including the humanities, social sciences, and the sickness. These are of the following types:

1. Audio recordings e.g phono-discs, cassettes, real to real tapes and compact disc.
2. Visual programmes e.g slides, slide/tapes. Filmstrips, sound from strip sets. Video cassettes.
3. News media.

Background to Media Preservation

Preservation as formal profession in libraries and archives dates for the 12th C, however, its the philosophy and practiced can be traced back to many earlier traditions. In Library Science preservations treated as an

active and intentional process, as opposed to the passive sense of preservation that might be applied to archaeological finds. The survival of these items is a matter of chance from an information science perspective, while the preservation of them thereafter, their discovery is a matter of intentional activity.

Recording, keeping by humans dates back to the cave painting of the Palaeolithic, some 32,000 to 40,000 years ago. More direct antecedents are the writing systems that developed in the 4th century, B.C. written record keeping and information sharing practices, along with oral tradition sustain and transmit information from one group to another. However, preservation has been supplemented over the last century with the professional practices of preservation and conservation in the cultural heritage community.

Causes of Damage to Media Materials

Deterioration or damage to the media materials is a change of original state of any material by interaction between the material and the factors of destruction. The different types are reflected in wear and tear, shrinkage, cracks, brittleness, warping, bio infestation, discoloration, abrasion, hole, dust and dirt accumulating, etc. Generally media materials like their library materials are susceptible to damage by the following factors:-

1. Environmental (Climatic Factors) factors like light, heat, humidity and moisture, dust and dirt, water.
2. Biological factors:- Micro-organisms, insect and rodents.
3. Chemical factors
4. Human factors and
5. Disasters

Preservation of library materials library media materials are done to safeguard the library materials from further decay and disfiguration. Preservation are of different types and they include:

1. preventive measure
2. curative measure

Preventive Measures: include all forms of direct actions aimed at increasing the life expectancy of undamaged or damaged elements of media materials. It comprises of all actions aimed at good house-keeping, caretaking, dusting, periodical supervision and prevention of any possibility of damage by physical, chemical, biological and other factors.

Curative measures: Consist of all forms of direct actions aimed at increasing the life expectancy of undamaged or damaged elements of

media materials. It includes repairing, mending, fumigation, classification, lamination and other jobs which are required considering the physical condition of the individual document.

Preventive Measures from Environmental Factors

Control of environmental factors begins from selection of site, the planning and the construction of the library building and also the soil on which it will be constructed.

It is important to choose the best architectural design for the library having cross ventilation facilities for free air circulation within the building. This is especially necessary in a tropical country like Nigeria where power supply is epileptic that constant power supply which will enable use of air conditioners and fans become a luxury for most libraries.

When and if there is need to use wooden materials the wood selected should be seasoned and must be treated to avoid insects. Growth of plants near the building must be avoided, and trees with the type of roots which can damage the building foundation should be avoided. It is always better to construct buildings away from traffic and bus stops to avoid dust, dirt and noisy. Provision of adequate number of air conditions, electric fans and few exhaust fans will facilitates air circulations in the media library.

Sunlight should be prevented from falling directly on media materials like floppy diskette, Video tapes, compact disc, among other media. However, the amount of damage by light depends upon the following factors.

- *Intensity of light*: as the intensity of light increases to the rate of deterioration of the media material also increases.
- *Duration of exposure* : the duration of exposures of media material to light is proportional to its deterioration.
- *Distance from the source of light*- More the distance less the damage.
- *Heat*: Usually the source of heat is light atmosphere temperature, high heat with low humidity causes an audio-tape to casing the shrink and sometimes gum together. On the other hand, high temperature with high humidity creates the condition for the growth of moulds on the paper case of the compact diskettes

Book Binding as Method of Preserving Library Materials

Objective

The candidate will know at the end of this module

1. Some other binding tools for presentation of library material
2. Proper and correct application of these materials
3. Know the difference between the materials in which the binding materials are applied.

Introduction

The focus of this lecture are – Those binding materials, whose roles are not very prominent, but the failure to ensure that this quality is good could lead to weakening of the book, journal and other non-print library, materials at a later date.

These materials include cover materials like Boards, leather, linen, leather substitutes among others.

A. Boards

1. Cope Boards is the best but is now difficult to get due to scarcity.
2. Mill board can be use as second best
3. Board from brown wrapping papers.
4. Board from straw.

Characteristics

Rope board; though tough and spring initially contains sufficient iron impurity to accumulate sulphuric acid from contaminated atmosphere consequently lose strength in which the same as paper and similar condition, though more slowly.

- The straw board is less likely to suffer from this kind of deterioration than the mill boards.
- Mill board suffer from excessive lamination due pressure used in sheeting it. This can cause it to split or open out on handling. If its weakness to bending stresses could be removed, it would be preferable for permanent binding.

B. Leather

The standard materials, for books bound to last over a tanned goat skin, and other leathers.

Leather Advantage and disadvantages

- Very good for spine of a book
- Vellum has tendency to swell and shrink with changes in its moisture content.

It has a higher resistance to wear and tear than any other normally used cover material Its durability even in a sulphurous atmosphere is excellent owing possible to the absence of catalytic metal and the presence of a reserve of alkali

- However it has inferior suppleness in compression with leather.
- It is a natural product obtained from a large variety of animals
- It is used by most binders especially for high class work.
- It is soft and strong.

- Its chemical nature gives it the property of holding fast well to paper boards, linen and cellulosic materials in general.

When glue and paste are used, it is much superior to many of the so called imitation leathers and leather cloths. It is usually more expensive.

Linen

- Very good for cover of books
- Last hundreds of years like the leather. It can withstand functional wears.
- Main differences between leather and the textiles used for covering this in the arrangement of the fibres in each.

Leather Substitutes are Nitrocellulose and chloride

- the substitute be avoided because after a long period
 1. traces of hydrochloric acid can be seen.
 2. It is difficult to cause it to yield to anything by ordinary means.

Summary

Whether the old rope board, mill boards, leather, linen or leather substitutes are used each has its merits and demerits.

Book Binding

Introduction

A well bound book is a product of good material and sound techniques.

General principles and consideration

1. mending and repairs
2. duplicate
3. cleaning and resizing – eg soak paper in weak permanganate ganises dioxide rinse in water and resize the paper discourage mutilation of library material – notices saption of culprete.
4. cutting the edges and treating with wax polish
5. send library personnel to learn bindery and preservation of library materials. There could be a conservation Librarian. Where this is impossible the Reference, Acquisitions or reader's service librarian can be trained to combine this job with their primary assignment.
6. In addition to the above
7. The Librarian should make sure good quality books and journals are brought into the library, had copy is to be encouraged books made of news print is to be discouraged.
8. Rebinding should be done periodically esp. for mutilated books and back copies of journals.

Adhesives as a Medium for Preserving Library Materials

Objective

The reader should know

1. The importance of adhesives developed from the earliest times to the present day.
2. The important role played by adhesive in the process of preservation of books and other library materials
3. That adhesives stand very high in book preservation

Principles of Adhesion

The use of adhesive in book binding is regarded as a necessarily evil.

- Most adhesive dry to a horny which in the case of paper will have an abrupt edge.
- Adhesive hold two surfaces together, either by Mechanical or chemical binding or both.
- In mechanical binding, the adhesive is forced into minute undercut hollows in the surfaces of the paper to which it is applied, on drying, these form hard dumb bell like anchors in the substance of the paper

Introduction: Adhesives were used in a sophisticated manner even in ancient times. Recent years have seen the rapid development of adhesive binding as an economic and effective method for the fabrication of components and assemblies. The great many types of adhesives are currently in use and there is no adequate single system of classification or all products. The adhesives industry has generally employed classification based on end use, such as metal to metal adhesives, wood adhesives, general purpose adhesives, paper and packaging adhesives etc. The module covers the types of adhesives that are commonly used by binding to repair/make materials used in the Library.

The chemical binding is rather more difficult to explain in simple terms. It can be illustrated quite simply by applying this paste to clean paper and to paper thoroughly impregnated with wax. The clean paper will be wetted by the paste while the waxed paper with its chemically different surface actually repels the paste.

Three stages in the setting of adhesive

A fluid stage for free manipulation.

- Set after the joint has been brought into the second
- Of final set to reach maximum strength
- An adhesive should be as strong as the material it is setting
- An adhesive can make the paper to which it is applied too wet and therefore severe writing.

Types of Adhesives

Starch Pastes

- starch paste made Egyptian to join sheets of Papyrus into longrolls.
- Commonly used for papers and leathers
- It is usually more convenient
- Modern version has improved flow qualities i.e. less mouldy and increases the resistance of the finished joint to moisture.

Home-made Gelatines

Home made pastes can be given properties which are especially suitable for permanent archive work and can be used without the risk attending the use of commercial pastes.

- It is simple to make
- Cheap
- Effective for paper and leather
- Antiseptic should be used for paste to be kept for a long time
- Some builders combine the glue and paste so that the paste slows down initial set of the glue while the glue imparts tack quicken the past.

Cold Water Starch

This are modified starch that give the acceptable paste when mixed with cold water.

- Used for paper hangers
- Used by decorators
- Suitable for rough work

Spray Starch

Glues and Gelatines

Made from animal skin and bones. The essential difference has in the greater purity of gelatine

- The skins used are generally the framing cut from the hide and skins to be used for tanning
- They are soaked in lime to remove hair and further soaked in strong limes until well swollen, they are thoroughly extracted in successive lots of water, at increasing temperatures until most of the glue has been removed and systematically required strength and allows it to cool and set to a jelly which is cut into sheets of slabs and dried.

Properties of Glue

Ink

How early Inks were Manufactured

Earliest inks were suspensions of carbon in gum were suitable for use with papyrus which was pores enough to absorb the ink and entrap the pigment between the fibres.

This type of ink had permanent, indelible and harmless to the papyrus. 11th C witnessed the iron-gall inks.

The two (carbinum ink and iron, gall inks) were in use until the advent of the of the blue-black ink period. It is probably that small amount of carbon pigment were used to make iron-gall inks more legible immediately after writing

Aniline dyes: brought radical changes in ink manufacture

Composition of Modern INKS

The old simple iron-gall inks were made by fixing ferrous sulphate (copiers) with an infusion of oak galls or other tannin containing vegetable matter.

Before explosive to air, this liquid is almost colourless and thinly fluid.

When used on paper for vellum, the writing is at first barely visible. It sinks rapidly into paper with a tendency to spread.

After a few days the writing becomes a dense black one due to exudation of the soluble .

Almost colourless ferrous ternate of the fresh ink to the deep black insoluble ferries ternate which is permanent. The oxidation is brought about from the air.

By the addition of an aniline dye the almost colourless freshly made ink could be given sufficient immediate colour to avoid the necessity for a perfumery oxidation.

Iron-gall dye mixture became the popular Stephens blue ink.

It was easy to write on size paper, but rather to acidic for still pens.

Most modern inks are made to overcome one or more of the disadvantage inherent in blue black into their acidity, muddiness' and nit- quite perfect permanence.

Modern writing inks for paper

Iron-gall inks extensively used for records where permanence is important.

They have been almost entirely suspended for use by modern fountain and ball-point pen.

- Synthetic dye industry has improved the fugitive dyes in terms of variety and fastness.
- Dyes used for ink manufacture are very numerous.
- Two commonest defects as these inks are
 1. poor light fastness
 2. Solubility in water or other solvent document becomes wet (accidentally) the writing may become illegible

Blue-point INKS: consist of fairly fast dyes in an only solvent .

Disadvantages

1. Readily soluble in alcohol and other non-aqueous solvents
2. They do not sink deeply into the paper

INKS for Vellum and Parchment

Modern Vellum and Parchment documents have usually, been sufficiently important to escape the fountain and ball-point pens. They are usually written in iron-gall or in one of the carbon gum inks.

- Carbon-gum inks are used surprisingly often probably with the idea of matching the known permanence of the two materials.
- An iron-gall, on the other hand bites into surface of both vellum and parchment and may even penetrate some distance into the more porous parchment so that it will be more difficult to remove.
- To overcome natural greasiness of parchment and vellum, the surface is roughen by pouring with timely powdered pumice.

Typewriter Inks.

3 categories

1. Typewriter Ribbon and Stamp-pad inks
2. Hectographs
3. carbon Tissues
4. Stencils
5. Offset Litho

Summary on INK

The importance of ink cannot be over emphasised.

- Inks as a tool for documentation have undergone various stages in its development.
- Earliest entries were essentially suspensions of carbon in gum.
- Modern ink is made up of a mixture of ferrous sulphate with oak of other tanning containers vegetable matter.
- This is not suitable for ball-point or fountain pens.

- Ball-point pens will mark very well with solutions of fairly fast dyes in an only solvent of fairly fast dyes.
- Typewriters inks are classified into two

1. *Ribbon and Stamp-pad inks*

The ribbon is made from tough textile fabric with soluble dyes.

- Coloured ribbon contains fugitive dyes.
- Stencil inks lend themselves to the use of pigments, while grassy ink is commonly used with offset litho. This is because typing is done on a metal sheet.

Computer Ink
Photocopy Toner

Preservation of Library materials by Sewing

Objective

At the end of this module the reader will know

- The importance of usefulness of threads in pressing and conserving the media materials
- Know the most durable of the sewing material

Introduction

Linen and silks were available before the pre Christian era. They are known to survive between 500-1000 years.

Threads

Thread can be gotten from cotton, silk etc. The best threads for book are synthetic ones like Nylon and terylens. They are free from

- Rot when damp
- Retain a large part of their dry strength when wet.
- Free from contaminating metals that can cause pollution to the atmosphere.

Cord and Tapes

Long life of books and other library materials depends on very much the thread cords of tapes than on other structural components apart from paper.

- Silk and Nylon are sensitive to violet light.
- The best silk that has not been processed.
- The most durable silk is silk in Gum.

Preservation of Media Materials

Media materials are non printed that are sometimes described as Audio – Visual Materials. They included pictures and posters in its simplest forms

and Information Communication Technology (ICT) as it applies to the Library. Library Media is usually classified into two groups namely Hard and Soft wares.

The Hardware are the equipment that is needed to operate the software, like the computer, slide projector, Television, Radio photocopier, etc On the other hand the software are wares like Flash diskettes, CD-ROM, slide, films, and audio and cassette tapes, among others.

Preservation in academic and research Libraries are not new concepts. However, with an increasing amount of digital content, organisations have to cope with new set of preservation issues.

Media preservation is in its infancy worldwide and presents some different technological issues. Since the creation of digital media, over 200 different storage medium have been inventing ranging from magnetic tape to CD-Rom. Each of these medium presents a variety of their own preservation issues and also requires a diverse range of technology which in many cases is no longer manufactured. In addition there are thousands of different formats in which data can be stored on each medium; and each type of storage format may also require specific software to interpret the data's meaning.

What are academic Libraries to do in order to ensure that they protect media materials? There are no clear standards in the area of media preservation and with most institutes lacking resources already there are no clear details about how to tackle these issues.

This paper documents the investigation about move to reference

Some types of media materials in Nigeria University Medical Libraries such as Microfilms, e-journals, E-books, and the issues that arise in their preservation.

Problems

- **Viewing problems:** Most media material requires some technology to view them. By nature technology (software/hardware/formats) change of such rapid place that they become outdated easier and in some cases it becomes impossible to view the software because there is no part to fix/repair the hardware that is suppose to read it.
- **The scrambling problems:** Data is often compressed or "scrambled" to assist in its storage or protection of its intellectual content. These compression algorithms are often developed by private organisation who will one day cease to support them. If these happen you are stuck and no longer above to read the data unless you want break the copy write law.

- **The inter-relation problem:** Digital information is often linked with other items this is more evident in the digital world than the physical. If these links are not maintained the information is either incomplete incorrect, or just plain.

The custodial problems

- The issues of the real custodians of a digital document arises, If indeed the librarian is the custodian, what happens when it is changed without the knowledge of the librarian? This can happen because of the dimension of the digital document.

Translation Problems:

When there is need to interpret data due to formats etc) and software change version to version it will be translated differently in subsequent versions. In other cases it can be lost. for example 1960 United States Census was stored in new obsolete computer tape only one machine in the United State of America can read it. **Level of functionality** – even though progression in technology often invites institutions to make from one storage medium to another through forced obsolescence, the improved medium do not always deliver sum level of functionality in most cases libraries who initially began migrating data do digital repositories under the banner of economy have find that it is too costly to keep up with technology and are using microfilm and acid-free paper to back-up digital content. The shelf life of a CD-Rom is predicated to only about two years (Malda, R. 2006)

Massive storage failure, no matter the amount of money spent on the system housing the data there are still many ways in which it can fall over and create opportunities for data to be lost. This may be from hardware/software failure or an act of wear.

Mistaken erasure:

Some times people accidentally delete things and it is the only copy. At other times people think they no longer need a piece of data and delete it on purpose only to find that it is in fact useful.

Bit Rot

No digital storage medium is completely reliable over al long period of time. Eg. CD-Rom has a life span of 2 years. Other media such as magnetic tape also suffers various types of bit rot. Usually this is not detected until it is for late and lot of data has been lost. Experts need to be employed to check media regularly to minimise data loss Melda (2009). Thus too and dated this too in the long rural is expensive. Bit rot is inevitable.

- Outdated Machine
- Technology driven by innovation relevancy before redundancy. Part stored on redundant media becomes effectively useless if the appropriate hardware is not available to read it.
- Outdated formats Applications and systems
- As the hardware becomes redundant, so do file formats and the software which interprets them. A good eg. Of this is the WordPerfect. It is difficult to find a computer that can read this perfectly.
- Loss of context
- To solve this problem, the librarian should preserve a copy of the appropriate software and make it available wherever the data is stored; this becomes unmanageable as the type of the systems required increases. The second is
- International attack
- Lack of Resources
- Organisational failure

Solution

Since it is common knowledge that problems affecting Media Preservation can be broadly grouped into Chemical, Natural, Biological, Environmental, Physical and Physical factors. The librarian has the responsibility of ensuring that library material resources are preserved through pre-disaster plan, disaster plan and pos-disaster plan

This would include:

Pre-disaster plan:

- (a) Routine training of library staff and users on the handling and use of library materials
- (b) Ensuring the existence of a proper cooling system (like the air conditioners)
- (c) Proper storage: usually a metal cabinet will shield the materials from sun light
- (d) Disaster Policy should be put in place and staff made to obey it. This should include switching off of all appliances at the end of a work day.
- (e) Proper citing of the Library building.

Disaster plan:

- (a) Routine binding of mutilated books should be done and photocopy of library materials should be encouraged to reduce theft.
- (b) Archiving and digitising of valuable library materials should also be done to elongate the life of a library material.

Post Disaster plan: Employment of a staff who specializes in conserving and preserving, library materials.

- (a) Eating of food in the library should be discouraged to ensure reduction of rodents.
- (b) Fumigation should also be done regularly to kill insects like the bookworm.

These measures among others will

Archiving of digital Materials

Digital preservation describes the processes involved in maintaining information and other kinds of heritage that exist in a digital forum.

Digital materials according to K.J. Weinberger, E and Stone A. is any material render able by a computer and includes both that which is digitized (reformatted to digital) as well as those resources that are born digital.

Digital preservation on the other hand is simply defined as the storage, maintenance, and accessibility of digital material over the long term.

In general, digital preservation involves a number of organised tasks associated with a variety of technical approaches or strategies for ensuring that digital resources are not only stored but also adequately maintained and consistently useable over time. Although digital material preservation ensures, the material is kept technically accessible, preservation of digital materials is not simply a technical issue. There are legal, economic, and organisations factors to consider. Despite the new media, many traditional skills and knowledge need to be applied e.g the selection and evaluation of materials of materials for achieving or copyright and access management.

Digital Preservation strategies

Broadly divided into 3 main technical approaches to digital materials.

1. Technology Preservation
2. Technology emulation and
3. Data Migration

In order to preserve the functionality of any digital resources there must be preservation in some form, of the technical environment, which

created and ran it. Data migration strategies focus on the need to maintain the digital files in a format which is accessible using "current technology, and require regular migration from one technical environment to a newer one. Each strategy will be described briefly.

Technology Preservation

Digital materials relies on the technical used to create it in order to preserve the functionality and "look and feel" of the product, then the most obvious approach is to preserve the original technology. This is a "Museum" style" approach and probably only suitable as a short term solution. Hardware and software from the object itself are maintained so that access can be guaranteed. This also means that access is limited to a specific physical location (i.e. where the hardware and software are kept. The cost implication for storing this kit is probably beyond the realm of possibly on a large scale. Over the years the achieves themselves will inevitably degrade, making this approach problematic as a long term-strategy. In the United Kingdom the Science Museum and the Computer Conservation Society are interested in the merits of this approach and are currently maintaining old computer which may prove valuable resources for scholars in the future (Reissel etal 1999)

For a Library or publishers the space and resources needed to maintain old systems would in all likelihood make this approach impossible.

Technology Emulation

Emulation strategy seeks to preserve the environment not through the preservation of original hardware/software but by using current technology (mipric the original environment. This may involve the emulation of the original software or the emulation of the original hardware. This means the original software and operating system are stored along with the digital object itself, in each case, the strategy relies on a detailed description of the original environment on which to base the emulation in future. The emulation itself is not necessarily stored in the archive, it maybe created at a later date when there is demand for the material. The detailed technical description (metadata) on which this strategy is often based is a key component of an emulation strategy and as yet, there are no standard approaches available for description of this kind. Although controversial, many experts are of the opinion that a truly long term preservation emulation is the best solution it accepts the necessary of preserving the original technical environment but ensure that material is not held hostage to obsolete technology. Instead it can take advantage of new technologies as they develop for emulation. It is also their view that future technologies will be more effective, cheaper and faster.

Data Migration

Data Migration focuses on maintaining digital materials in current formats. Many libraries and publications are involved in regular migrations for image files, e.g. moving images from one software version to a newer version. The attraction of this strategy is that materials are maintained in an accessible format. The two strategies,

Above both advocates storing the material as a byte stream in its original format and then making it accessible when necessary. Data migration means the material is maintained in the archive in a currently assessable format. In a library this is an important advantage.

However, there are also disadvantages and these include

1. Migration can be complete and time consuming.
2. The frequency with which it would need to be done in accordance with fluctuations in the volatile technology market place is unpredictable
3. Migration strategies must also assume some loss of data no matter how inconsequential. When a resource is moved into a new technical environment eg from one form of Microsoft PowerPoint to another, some of the original data will be lost in transition, some times the loss is identifiable and made clear and sometimes it is not. This potentially unknown data loss makes migration somewhat probably

Data Refreshing

This is the systematic transfer of stored materials to newer and fresher media. This could be from one magnetic tape to another. Refreshing does not imply ensuring the material is kept useable – it is only the transfer of a byte stream from one medium to another. Migration focuses on keeping the material functional with new technology.

Management of digital resources to ensure long term preservation managing information resources no matter its format enquires a comprehensive system of documentation and description, digital preservation and digital archives are no exception. As implicit in the technical issues involved particularly in the case of emulation, for digital preservation strategy to work, digital objects must include a great deal of documentation which will need to be accessed, queried, and updated regularly. The descriptive information needed

To archived this is referred to as metadata i.e. “data about data” (Russell K et al)

Metadata necessary to archive digital materials successfully must support a wide range of archival functions from resources discovery through access control, document integrity and finally preservation itself.

In a nutshell, preservation programmes have certain responsibilities and functions that have been defined at least at a conceptual level. Comprehensive programmes must take control of appropriate digital materials and ensure they remain understandable and useable as adhesive copies. This generally involves taking the materials, properly prepared, along with associated documentation of metadata into an archival digital storage system of some kind where they can be managed to deal with the increase of data loss and technological change (Natural Library of Australia 2003).

For those charged with archival collections, here are some tips on how to conserve electronic maps and systems, using PCs:

1. Always make safety copies of your programs, before you install them on your PC. Copy each floppy disk. If you have access to a WORM system, duplicate your CD-ROMs or play them on a streamer. Even if you locked the floppy-disks, it may happen in confusion or a crash that your programs get damaged. With a copy in a safe place, losses can be avoided. Copy your floppy disks after 5-7 years on new ones or store them on a tape (and copy this tape onto a new after one some years, too (McAnlitte, W. 2001).
2. Do not trust your PC's hard disk. Even if you intend to use your most sophisticated PC for years and years, you will be required one day to refresh the hard disk for several technical reasons. It is good to know how the software and the data for your digital maps can be restored at any time. It is better to build up the original systems; backups always include all the corruptions that happen while using systems, in particular if you work with Windows.

Make (besides the above mentioned disk copies) a documentation of all software needed by the map programs, e.g. the DOS-version, the Windows version and any system platform you need for your digital maps. Do not forget to keep a safety copy of these programs.

Finally, do not throw away the handbooks of these programs after use, even if they are greasy or very fragile.

3. The estimations of a disk's life vary extremely. Floppies are said to fall into decay after 5-10 years, aging tests claim up to 100 years. It will depend on the quality of disk, as has been proved by the CD-ROMs. Estimates vary from 5 to 30 years.
4. Take care of your CD-ROMs! Do not put labels on them for two reasons: CD-ROMs revolve at up to 30,000 r.p. m and eccentric labels may throw the disks out of balance, which causes mis-readings and damages the player; the adhesive of the labels can seep through the protection layer and damage the information

surface. Do not write on the surface with a felt-tip marker; do not scratch them; store them out of direct sunlight.

5. A last tip for a not so distant future: do not forget that today's systems will be antiquated one day. When you work with an old fashioned globe, you need only your eyes and expert knowledge; in the year 2014, when you want to work with the digitized map you ordered just yesterday, you will need a machine that can read the old-fashioned disks, and a software that may convert the programs and print out the maps.

For the same reason it is recommended that curators keep at least one set of today's PC, CD-ROM drive and printer. In the for-mentioned year 2014 it will be easier to run on the original machines one of the exciting cartographic map program system we were shown - and you and your students will better be able to understand why people at a meeting in Zürich, 20 years before, were so filled up with enthusiasm when they admired so-called digital maps on giant and finger-driven grey boxes..

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