

CHAPTER – II

***ARCHIVES : PRESERVATION AND
CONSERVATION OF RARE MATERIALS
IN DIGITAL FORM***

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2.1: INTRODUCTION:

This chapter deals with Preservation and Conservation of Rare Materials in Archives.

Preservation is a branch of library and information science concerned with maintaining or restoring access to artifacts, documents and records through the study, diagnosis, treatment and prevention of decay and damage.

It should be distinguished from conservation which refers to the treatment and repair of individual items to slow decay or restore them to a usable format. It is continuous process. Because such type of rare material should retain for future generation.

In case of changing format of such rare material, it can be in the digitized form. Preservation of digital information is widely considered as one of the storage of e-resources need constant attention than preservation of other media. This required continuous efforts, time, and money to handle rapid technological and organizational advance which is the main aspect of preserving digital information. We are able to preserve and read our written heritage from several thousand years old if documents convert in digital format, which will remain forever.

Digital preservation can therefore be seen as the set of process and activities that ensure continuous access to information for all kinds of records, scientific and cultural heritage exist in digital formats. This includes the preservation of rare materials of archives. In the language of digital imaging and electronic resources, preservation is no longer just the product of a program but an ongoing process where digital information is

stored ensuring their longevity. The long-term storage of rare document in archives is assisted by the preservation by way of digitization.

*Digital preservation is related with the long-term, error-free storage of documents, with means for retrieval.*¹

2.2: DEFINITIONS:

Before going to discuss about preservative, it is necessary to see the definition of Preservation, Conservation, Rare material Archival Digitization.

Digitization: may be defined as the process of converting information into a digital format. In this format, information is organized into discrete units of data (called bits) that can be separately addressed (usually in multiple-bit groups called bytes). This is the binary data that computers and many devices with computing capacity (such as digital cameras and digital hearing aids) can process.

Also image capture, is the process of creating a digital representation or image of an original document through scanning or digital photography. Digitization is a precondition for electronic storage, such as magnetic storage, storage on optical disk, and character recognition. (e.g. ICR, OCR).

Herold L.M. defined *Preservation (Archive)*² as

1. Primary function of an archive depository to provide adequate facilities for the care, protection and maintenance of the archives of whatever kind. It means one has to take maximum care while protecting rare material in terms of preservation.

1. http://www.wikipedia.org/wiki/Digital_Preservation accessed on 10 Sept. . 2010.

2. The Librarians glossary and reference book 4th Ed. By L.M. Herold, London, Claron Books, 1977, P.657.

In ancient time, manuscripts, archives/documents mostly written in scripts. Sometimes they were written on papyrus, leaves of trees, paper and kept in the leather pockets or some times these documents were tied together like a big notebook and covered with hard paper or leaves or cloth. The reason behind it is to preserve these materials for future generation. Because it took years together to written such document and manuscripts. It was therefore necessary to store and preserved it properly to protect from heat, rain, insects. Sometimes such materials kept into wooden boxes or tied in clothes within wooden boxes. Inside boxes, certain proper place was provided, where it should not be damaged while handling. Sometimes they use to spreay anti-insectised powder, for protection and damage. Such boxes also were locked safely to protect from theft.

Most of the archives centre keep their manuscripts and rare documents in clothes. Even before putting into the cloth such documents kept between wooden flange for protection. It is seen that to protect from insects and termites regular treatments use to give for building and the materials too.

It is observed that maximum care provided to protect such documents from biological and geographical agents. There was search to identify new media which will store such rare documents. It is found that and generally practices followed in other countries. Microfilming or to convert it into digital formats and the solutions for such record and rare documents. One has to have planned policy for digitization which includes proper selection of hardware, software and trained manpower to handled the entire project.

Specific individual and collective measures needs to be taken for the repair, restoration, protection and maintenance of such archives.

The Conservation³ (Archives) defined as – The use of chemical and physical procedures in treatment or storage to ensure the preservation of a document. In case of conservation documents need to be provided chemical treatment without damaging original document.

The Archives⁴ defined as public record or historical documents kept in recognized repository... digital library. Where such types of documents are kept in Kolhapur and Satara archives. These are public records, hence, it needs to be preserved and conserved with the utmost care for the society.

2.3: NEED FOR PRESERVATION, CONSERVATION AND DIGITIZATION:

The rare material available in archives needs to be protected keeping in mind its value and age of documents. Generally followed solution for archives is to convert it into microform. But because of developments in science and technology, new media for storing has been identified i.e. floppies, CDs, such rare material converted into digital format because of the need of present era. The reason behind, choosing new storing format is if more storing capacity, easy access for retrieval, and becoming more popular and cost benefit too.

One of the major crises facing by libraries is the very high rate of deterioration of their collections. The preservation of books and documents in original form is essential because they had scholarly value

3. Ibid – P.226.

4. Ibid – P.27.

as objects as well as for the information they contain. The challenge to preserve these materials, called artifacts, requires an understanding of the scholarly value of artifacts and the development of an effective and efficient strategy for their preservation and conservation.

Primary source materials in museums, archives and libraries consist of a variety of rare and fragile formats. The advantages of digitizing rare and fragile materials are not related with preservation of originals from handling but also more with the storage and access to these special collections. In terms of access, digitization can enable the public to view and consult these collections to enable broader access to the original material. In terms of preservation, the creation of digital surrogates can eliminate handling of fragile original material.

Librarians and archivists are custodians of the information stored in their collection on whatever format it appears, and all such formats and materials need conservation. Although audiovisual materials have been in existence for well over a century, their widespread use and collection in libraries and archives is a late 20th century development. This will be the first complete century of human history to have been documented by sound and moving images enabling future generations to relive its events orally and visually in addition to traditional printed documentation.⁵

The foremost reasons behind digitization are to enhance access and improve preservation of documents mainly those are rare ones. The digitization is more popular in case of cultural heritage preservation projects. By digitizing the collections, cultural heritage institutions can open their collection to one and all for the noble cause of study and research. This also facilitates to search collections rapidly and comprehensively irrespective of the venue and time.

5. <http://www.bsu.edu/web/jladams2/rends.html>. accessed on 13 Oct. 2010.

The need for Preservation, Conservation of archival material in digitized form as :

- 1) To save the space, available in archives.
- 2) To save the time required to access and retrieve more materials and information contained in them.
- 3) To face the challenges of huge data and its Preservation and Conservation
- 4) To adopt latest technological developments in the field of storage, retrieval and dissemination of rare information for longer duration of time.
- 5) To make available rare information on-line.
- 6) To provide immediate and easier access remotely.
- 7) To enhance the search ability for full texts.
- 8) To integrate different media and reduce the burden of cost delivery.

2.4 : BENEFITS OF DIGITIZATION:

Now a days most of the rare documents are going to convert in the digitized format. Because digitization offers considerable benefits. Some of these are mentioned below as -

- i) **Easy Access** - One of the major advantages of digitization is that it allows increased access to the object. Digitization offers quick and easy access to multiple users simultaneously from anywhere in the world. Thus it enables equal access to a widest range of users. The various digital objects can be easily incorporated into instructional and educational applications.
- ii) **Easy Duplication** : The digitized information can be reproduced to create multiple digital copies without any loss of quality. Duplication does not degrade the Master File.

- iii) **Automation** : The process of making copies can be automated as the document is made up of a string of binary numbers. It is also possible to generate copies at a very high speed.
- iv) **Ease of Search and Retrieval** : Digitization enables quick and easy searching of the material available in digital format with independent of location. Various search and retrieval techniques, indices and other tools are being devised for text image, audio and video material existing in digital format.
- v) **Less Storage, Space Requirement** : Digitization leads to a high degree of storage space compression. The digitized information requires less storage space which in turn leads to reduction in running costs.
- vi) **Image Enhancement** : Image can be electronically restored and enhanced by eliminating extraneous stains and marks and restoring faded colour similarly, legibility of faded and stained documents can be improved. Image enhancement enables the researchers to analyse the details that cannot be seen by the human eye unaided.
- vii) **Ease of Use** : The digitized material can be used in a variety of ways for instructional and research purposes. The digitized text and images can be manipulated and customized according to the user needs.
- viii) **Purposeful Collaboration** : If an institution has digitized a collection it can be accessed by other institutions and then integrated into their own virtual collections depending on copyright restrictions. This can in turn reduce the wastage of time.

2.5 : DIGITIZATION PROCESS:

Digitization Processes are numerous and in needs to be systematically done. Because after scanning the image of scanned text needs to be stored properly. It includes following points as:-

- a) Image scanning.
- b) Microfilming and then scanning the microfilm
- c) Photography followed by scanning of the photographic surrogates.
- d) Re-recording video and audio on to digital media.
- e) Rekeying of textual content.
- f) Optical Character recognition of scanned textual content.
- g) Tagging text and other digital content to create a marked-up digital resource.
- h) Digital photography – especially for 3-D objects or large format items such as art works.

While there is significant variation in the original materials and the methods of digitization, there are common themes to every digitization project.

First, it is essential to access the original materials to identify the unique characteristics of the collection. These unique characteristics will drive the digitization mechanisms and help define the required access routes to the digital version.

Additionally, data files have to be organized with given file names and needs to be placed in some logical structure, where e-retrieval system can understand while browsing same document.

While undertaking any digitization project, it involves some or all of the following activities:

- Assessment and Selection of originals rare/archival document
- Grant applications and fund raising.
- Feasibility testing, costing and piloting.
- Copyright clearance and right management.
- Preparation of materials.
- Benchmarking.
- Digital capture.
- Quality assessment.
- Metadata design and creation.
- Delivery.
- Workflow processes.
- Project Management.
- Long term preservation, issues.

Without careful planning for all these elements, projects are unlikely to succeed. Costs will rise and acceptable quality may not be achieved.

2.5.1 : Hardware Requirement :

For digitization, some hardware is required. For this purpose commonly used digital capture device fall into two general types i.e. scanners and cameras :-

a) Scanners :

These are available in several forms including drum. flatbed and film. Traditionally drum scanners provide the highest quality, but are very expensive to use and hard to operate. More recently, flatbed technology has matured into a viable, easy to use and high

quality alternative at a price affordable by smaller digitization projects. Factors to be considered when selecting an appropriate scanner include optical resolution, optical density maximum scanning area, and bit depth a scanning time. There tends to be a natural trade off between quality, cost, scanning area and speed operation (fast larger than A4 and high quality units tend to be more expensive.)

b) Digital Cameras:

Digital camera is increasingly being used for image capture especially where flatbed scanning is impractical or might cause damages to the original material (for example a sculpture or a fragile manuscript). Today affordable consumer cameras are capable of delivering images of high quality for print or archival use. Professional cameras normally offer higher quality and greater flexibility in a more robust package but at a price.

An alternative approach is to capture the image on to medium or large format photographic film and then scan this using a film or transparency scanner. This procedure is known as using an analogue intermediary. As the image quality captured by digital cameras and scanners improves the image this process and becoming less common. One advantage of this process is that there is an analogue image, which can be archived along with the digital data.

2.5.2 : Software Requirement:

Digitization software can be broadly classified into two types i.e. image capture (and workflow)software and image editing software, although there is often a great deal of overlap between these two.

a) **Image capture software:**

Capture software can be found in various forms: from complex device to specific programs that control the whole capture process through to simple driver plug —ins that work within image editors image management software. Using a plug in might remove the need for a further piece of software but may also limit the functionality of the workflow. Using a dedicated image capture program is likely to add complexity to the process but can provide benefits such as a streamlined workflow or increased functionality or automation.

b) **Image editing software:**

The digitization project has two main uses for image editing software:

- **Image editing-** where captured images are prepared for further use including cropping, tonal and colour correction and any necessary image repair work.
- **Creating surrogates delivery images** — where images are re-sized, compressed and then saved in a file format appropriate for their intended use.

Choosing the correct image editing software for a project can prove a challenge and will depend on the uses and demands that are, made of it, as well as the budget available.

Factors that will need consideration include:

2.5.3 : Software interface for the scanner:

The streamlining of scanner interfaces has all but eliminated the need to know about such settings as device calibration (to match the scanner with monitor and printer), colour correction (for saturation and hue), dithering pattern (for halftone scanning),

adjustment of brightness and contrast levels, application of unsharpened and blur filters, and so on. Scans of equal or even higher quality can now be achieved in default mode. The technology has matured to the point at which most scanner drivers are automated and optimized so that prescan adjustments are rarely required.

Situated between the capture device and the application operating system is the device driver, the (usually device-specific) software interface that controls the hardware and retrieves image data. The specific interfaces, e.g., TWAIN and ISIS, exist to reduce the problem of each applications needing its own specific driver for each piece of hardware.

- *TWAIN, the most common of these interface applications, is extensible and platform independent. The image database).*⁶
- **ISIS** is developed by Pixel Translations. Although not as widespread as TWAIN, it offers a number of advantages. ISIS is implemented as a series of modules connected as pipes, which allows image data to be sent to multiple destinations, while other operations (such as compression, format conversion, file writing) are performed on the data simultaneously.
- **Accupage** A document imaging or Optical Character Recognition (OCR) driver geared toward OCR applications, for use with Hewlett-Packard scanners.
- **Others** some manufacturers may supply their own driver/application software for specific purposes. For example, Polaroid supplies a driver for its Sprint Scan range of film scanners that allows images whose files would be too large to

6. http://www.chin.gc.ca/English/Digital_Content/Capture_Collections/cap_scanning_images.html#types ACCESSED ON 13 Oct. . 2010.

fit in memory to be saved directly to disk; Kodak have available an application (Kodak Picture Transfer) that permits multiple image transfers, among other operations, from some of their digital cameras (something that not all TWAIN applications support)

2.6 : DIGITAL CONSERVATION PROCESS:

The process of digitization involves converting the existing library material into digital format. The physical or analog object is 'captured' by some device such as a scanner, digital camera or recorder, which converts the analog features of the object to numerical values, enabling them to be read electronically. The information is stored in digital form i.e. in the form of ones and zeros as bits and bytes. In library the information is usually available in the following forms – text, image, audio and video.

Digital conversion process include the following:

➤ **Document:**

These include text bibliography or full text, photographs, diagrams, charts, maps, colour images etc. They exist either in print or non print form and also as single unit or collections.

➤ **Data capture:**

It includes manual data entry (word processing,) optical character reorganization (OCR) or imaging using scanner.

➤ **Data processing :**

The text in to convertible document may require conversion or (diacritics or) special characters, images may need enhancement amplification or compression, in many cases a simple conversion from print to digitalis not enough.

➤ **Storage (media):**

The digitized information needs to be recorded in proper digital storage medium which may be hard disk, magnetic tape optical RAM or networks with work station to access.

➤ **Indexing and processing:**

Digitized documents need to be processed using standard protocols and indexing system. Classification using library system also holds much promise. Metadata application should be a major component of the digital information processing.

➤ **Retrieval and Display:**

It is a process through which an array of technologies for browsing, Displaying and applying packages are used ultimately help in access.

Digitization also involves the addition of new digital collection to the existing one with interface. The digitization process, briefly discussed below:-

2.6.1 : Digitization of Text :

Digitization of existing texts can be carried out through two main methods – transcription and Optical Character Recognition (OCR).

2.6.2: Text Transcription:

This is the simplest method of digitization and can also be referred to as keyboarding. This method involves use of a keyboard for entering data into a computer system. This is helpful in case of documents with complex layouts and passages of text. For examples, hand written diaries with notes in margins or newsprint comprising block of unrelated text on that page. Voice recognition software can also be used for transcription of text. This

software can recognize the human voice and convert its sounds into digital form.

2.6.3: **Digitization of Image:**

Some of the widely used file formats for images are GIF (Graphic Interchange Format) and JPEG (Joint Photographic Experts Group); PNG (Portable Network Graphics specification). The images could best store as Raster (or Bitmapped) images or Vector images.

Images are made up of pixels (i.e. picture elements) which are similar to grains in a photograph or dots in a half tone. Each pixel stores information about the colour of an image and can represent a number of different shades or colours depending upon how much storage space is allocated for it. Raster images are commonly stored in the file formats JPEG and GIF Vector graphic is another of image. These images are co-ordinate based i.e. two points a and b define a line and three or more points, define an area. Vector graphics are often used in virtual reality and 3-D modeling as well as in Macromedia flash application. A common file format used to create vector graphics is Encapsulated Postscript (.ps) Scalable Vector Graphic (.svg) is a newer format that utilize XML technologies.

Resolution of an image concerns the number of pixels held within the digital file and is measured in pixels per inch (ppi) or dots per inch (dpi). The resolution determines the quality of the images. High resolution has more ppi or dpi, therefore, greater density of colour formation and also larger file size.

2.7 : **Role of Digitization in Preservation and Conservation of Materials:**

Digital preservation is perhaps one of the most neglected areas in the electronic library arena, with large volumes of the data already lost because of lack of knowledge about long term digital preservation issues. Once digital conversion of the original and rare documents has been completed, the challenges of protecting the digitized form of materials from corruption or destruction becomes essential for the preservation.

This facet now being called digital preservation, typically concentrates on the choice of interim storage media, the life expectancy of a digital imaging systems and the concerning issues for migrating the digital files to future system. At present, two preservation methods are in practice which are closed related with digitization. These are -

- a) **Digital Imaging** : Digital Imaging technology is more popular than another reformatting options imaging involves creating an accurate picture of book, document photograph, or map on a different medium. This transformation will force libraries and archivists to transform their services and programs also. Digital imaging technologies create on entirely new form of information dissemination.
- b) **Microforms** : Microforms are generally grouped into two categories: Micro-transparencies and Micro-opaque, which can further be divided into various types. Under Micro-transparencies we have Roll Microfilm, Unitised Microfilm, Microfiche and Ultra fiche. In Roll Microfilm images are arranged in a linear way. Rolls are often split into small lengths, each of which becomes a unit, referred to as unitised microfilm, Microfiche comprises a number of rows of reduced images of documents produced on a transparent

sheet of film. Subject to the ratio of reduction the microfiche varies in the number of frames. In libraries ninety-eight frame microfiches are generally used. Ultra fiches have high number of frames. In ultra fiche the original is reduced over 100 times.

Micro-opaque can be divided into Micro-card, Microprint and Microlex. Micro-card is produced by photographic images. It is an opaque card with size of 3" x 5" containing a number of reduced images. Microprint is larger than micro-card having a size of 6"x9". Images are printed by photolithography. Images of microlex cards are produced by photographic methods. Its card contains 200 pages on one side. The size of card are approximately 6.5" x 8.5".⁷

2.7.1 : Digitization Technological Issues:

Digitization of documents should not be merely a fancy concept. It must be supported with its practical needs and utility. There are several questions that need to be asked before taking up the digitization. Is the digitization being performed simply to increase access, or to serve some form of archiving/preservation role (or both). In case of the present project the objective is not only to preserve the historical documents of Chh. Shivaji – III, Queen Jijabai and Rajarshi Shahu Maharaj and Satara Archives 1895 to 1975 period but also to provide a wider access for the benefit of the researchers. With the viewpoint of wider access, again the secondary issues such as whether to store the digital archive in a simple CD or hard disk to place them on www or LAN also comes into the picture. The other technological issues sometimes become more crucial which challenges the very form of

7. Mahapatra, P.K. and Chakraborti, B. Preservation in Libraries Perspectives, Principles and Practice, New Delhi: ESS ESS Publications, 2003 p. 189.

the original archives. For instance due to the inherent technological bottlenecks, the digitization may reduce the resolution and damage the original clarity of the document. The inter conversion of various file formats such as JPEG to TIFF in case of pictures and WORD to PDF and POST SCRIPT dictates the requirements of the client machine where the digital archive will be viewed. In other words, it is vitally important to be clear about the reasons and technological means available for barking on a digitization project from the outset.

2.8 : **Scanner required for Digitization:**

Some of the equipments used in digitization are mentioned below:

- flatbed scanners
- sheet feed scanners
- drum scanners
- open book scanners
- digital cameras
- slide scanners
- microfilm scanners
- audio/video boards (linked to cameras/audio or video players microphones/etc.)

A thorough technical and cost comparison of this equipment's is required before finalizing the methodology of digitization.

2.8.1 : **Types of scanners:**

Following are the types of scanners available in the market:

- **Flatbed scanners**, also called desktop scanners, the most versatile and commonly used scanners.
- **Sheet-fed scanners** are similar to flatbed scanners except the document is moved and the scan head is immobile. A sheet-fed scanner looks a lot like a small portable printer.

- **Handheld scanners** use the same basic technology as a flatbed scanner, but rely on the user to move them instead of a motorized belt. This type of scanner typically does not provide good image quality. However, it can be useful for quickly capturing text.
- **Drum scanners** are used by the publishing industry to capture incredibly detailed images. They use a technology called a photomultiplier tube (PMT). In PMT, the document to be scanned is mounted on a glass cylinder. At the center of the cylinder is a sensor that splits light bounced from the document into three beams. Each beam is sent through a color filter into a photomultiplier tube where the light is changed into an electrical signal.
- A **film scanner**, most commonly referred to as a slide or transparency scanner, is specifically designed for scanning transparent film-based materials such as 35mm slides or negatives. Some of the higher end film scanners can also handle medium (4" x 5") or large-format film or transparencies. These scanners work by passing a light through the film rather than reflecting light off it. Because of their small size, slides need to be scanned at a very high resolution. Film scanners are generally more expensive than flatbed scanners and are less versatile. An option for the 35mm slide scanner is an automatic slide feeder for batch processing.
- A **combination scanner** combines the transparency scanner and flatbed scanner in one unit. In addition to the usual glass plate for reflective objects, these scanners also have a separate built-in unit or drawer for inserting the film which can be scanned at high resolution.

Parts of a typical flatbed scanner include:

- Charge-Coupled Device (CCD) array
- Mirrors
- Scan head
- Glass plate
- Lamp
- Lens
- Cover
- Filters
- Stepper motor
- Stabilizer bar
- Belt
- Power supply
- Interface port(s)
- Control circuitry

2.8.2: Technical specifications of scanner:

- **Scanner Resolution** (in resolution, refers to the number of pixels the scanner can read in a given area. The amount of detail captured in the scanning process is determined primarily by the resolution of the scanner.

The higher the resolution, the better the quality of the scanned image. Resolution is generally given in dots per inch, or (DPI). Most flatbed scanners start at 300 dpi, that is, 300 pixels captured per inch (square) of the scanned area; 600 dpi is becoming standard, while professional scanners can scan at 1200 dpi or more. A 4" x 6" print scanned at 600 dpi will generate an image 2400 x 3600 pixels, for a total of 8,640,000 pixels. Film scanners normally require much higher resolution than reflective scanners because film is so much smaller than a photographic print. These start at

1000 dpi and reach 4000 pixels or more. A 35 mm slide (1" x 1.5") scanned at 2000 dpi will generate an image 2000 x 3000 pixels for a total of 6 million pixels.

- **Optical and Interpolated Resolution:** Film and flatbed scanners operate at a specific resolution, called their Interpolation can be used for scanning output directly to print to give a better quality when the printed version is enlarged.
- **Bit Depth:** Scanners vary in their ability to record colour, and most scanners can capture black and white and colour at various levels. The number of colours you capture depends on the bits or higher. While black-and-white photos and prints can be scanned as greyscale or 8-bit images, reflective materials such as colour images should be scanned at 24 bits. Film-based materials should be scanned at a minimum of 30 bits and saved as 24-bit images, since they have a broader tonal range than prints. Using the above examples. the 4" x 6" print scanned at 8 bits will generate an image file of 8.5 MB. The same object scanned at 24 bits will generate an image file size of 25 MB. The 35mm slide will generate an image file size of 18 million bytes, or 18 MB.
- **Dynamic Range:** Almost as important as bit depth, a scanner's dynamic range indicates its ability to record differences between dark and light tones. Dynamic range is measured on a logarithmic scale from 0.0 to 4.0. The greater the dynamic range, the higher the contrast and colour bit depth.
- Common flatbed scanners have a dynamic range of around 2.4, which is adequate for lower quality scanning. Newer 30 and 36-bit scanners have a dynamic range of 3.0, which makes them more adept at capturing detail from shadow areas within images. Film scanners generally have a higher dynamic range and drum scanners

go as high as 3.8. The most desirable scanner is one that combines a high dynamic range with a high bit rate. High-end 30 bit scanners can produce 1.1 billion colours, and 36-bit scanners can produce 68 billion colours. Although most software and output technology can only handle up to 24 bit images, these images contain better and more accurate colour than if you had performed the scan at 24 bits.

- **Scanning Area:** Scanning area refers to the largest object a Scanner can handle at once. Most flatbed scanners are limited to letter-sized material (8.5" x 11"), although legal size (8.5' x 14") are available. Some scanner software is capable of "stitching" scanned sections together allowing you to scan larger-format objects. Film scanners usually have a scan area that is the size of a 35mm slide or negative, although some scanners are designed to handle the larger formats. Drum scanners vary in size and are capable of handling much larger images.
- **Scan Time:** Speed varies with scanners. If one has a high volume of scanning, scanning speed will be an important consideration for both the preview and full scan times of images. One factor is the number of passes a scanner has to make to scan an object, although this is less important these days, as most scanners are now single-pass. Early scanners, especially the budget ones, were often triple-pass when scanning in colour. Total scanning time should be less than a minute. Another factor to consider is the speed of the hardware interface; large-size images require time to transfer to the computer.⁸

8. http://www.chin.c.ca/English/Digital_Content/Capture_collection/sub_section/Cap_scanning_images.html#types. Accessed on 25 Oct. 2010.

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2.9 : METHODS FOR PRESERVATION OF RARE MAERIALS IN ARCHIVES THROUGH DIGITIZATION:

There is great variety of media on which digital materials can be stored from punched cards and tapes which represent the patterns as a series of holes, to the wide range of electronic recording materials: floppy disks, hard drives, tapes, CD-ROMs, DVDs, etc. The methods of digital preservation or digital archiving are;

2.9.1: Technology Preservation:

Technology preservation is the maintenance of the hardware and software platforms that support a digital resource. It is relatively impractical and financial, unfeasible, because the large number of computers and programs would be needed to manage over a long period of time. For certain rare and important resources, the technology could be preserved for a time until a better term solution could be found. But, this is an approach clearly fraught with difficulty.

2.9.2: Refreshing:

Digital storage media have short lives therefore, the data has to be moved periodically to new media to ensure its longevity sometimes, this involves a change of medium CD-ROMs will be copied on to hard disks in a digital data store floppy disks may be copied onto CD-ROMs; at other times refreshing may take place because a particular media has become unstable and the files need to be copied to a newer more stable version of the same medium refreshing copies makes no change to the underlying data. It is a process that need to be carried out whatever other preservation strategies are adopted it is technically relatively straight forward with low risk of loss performed and documented properly.

2.9.3: Migration and Reformatting:

Migration involves change in the configuration of the underlying data without change in its intellectual content. Migration generally involve some reformatting. The simpler the data structure, the more likely it is that the content will be preserved.

Migration, reformatting and refreshing of data are processes that need to be carried out many times for long — term preservation. The main disadvantage of reformatting approach to digital preservation is that all data must be converted in each reformatting cycle. Missing cycle could mean that the data is unreadable in subsequent cycle reformatting is costly and labour intensive.

During refreshing and migration time care needs to be spent in validating data insure that there has been no corruption. Migration is also time critical and needs to be carried out as soon as new formats are defined and before the current format is obsolete. Migration cycles need to be relatively frequent — few digital originals will survive more than five to seven years without some attention.

2.9.4: Emulation:

For the more complex digital object there will be more loss in its migrating to new formats and generations of hardware and software for such resources emulation might be a better technique.

Emulation is the process of re-creation of hardware and software environment required to access a resource. It offers potential a solution for the very long term. This is a long term solution because of the technical environment.

It would be theoretically possible to emulate either the hardware or the software : software could be reengineered in the future is sufficient metadata about it could be stored or the software and OS (operating system). Created digital object could be stored with it and software

platform to run them could be emulated in the future, clearly emulation has promise but has not yet been fully tested as a preservation strategy.

2.9.5 : Data Archeology:

Sometimes it may be necessary to rescue a digital resource that has not been migrated but contains vital information. Occasionally data is discovered on old disks or tapes that have been accidentally preserved and data archeology has successfully rescued it.

Data archeology has also been purposed as a preservation strategy. In this model data would be refreshed regularly but no migration would be performed and no programs would be preserved to be emulated at a later stage. Instead data archeologists are left to puzzle out the data structures and connections in order to re-access the information

2.9.6: Output to Analogue media : e.g. COM

For many years, photography, microfilming and high quality photocopying were employed to provide surrogates that would satisfy the access needs for readers and preserve the original.

For analogue output as a preservation mechanism for digital files, it is limited to computer output to microfilm or COM. The COM process involves printing the digital data files directly on microfilm so that each page of data becomes separate frame in the film the COM is thus most successful for large volumes of alphanumeric text or for bitonal images.

2.10 : Digitization using Camera:

To reproduce archival material a camera with a “document” mode is ideal. It is worthwhile to evaluate some of the theoretical features of digital camera from digitization point of view.

2.10.1 : Digital Camera:

“A digital camera is an electronic device used to capture and store photographs electronically in a digital format, instead of using photographic film like conventional cameras, or recording images in an analog format to magnetic tape like many video cameras.”⁹

2.10.2 : Advantages of digital camera:

There are many advantages of digital cameras for scanning image. Some of them are as follows:

Digital photographs are extremely adaptable. They can be emailed or stored on the website or even can be burned on the CD or DVD.

- Digital photography eliminates the need for film processing.
- Pictures can be viewed virtually without delay on the display screen of the camera. Since there is no processing involved, digital photography does not need dangerous chemicals and is environment friendly.
- Digital photographs are very easy to edit using software packages. There are several image editing software that allows to alter digital images in number of ways.
- A Digital images can be processed to enhance their effectiveness. The following processing is normally done on the digital images.
- Cropping to clean the edges.
- Changing the colours.
- Adjusting the contrast Removing the imperfections with the aid of he image editing software, all the above mentioned steps can be accomplished in a very short time.

⁹ <http://www.chin.gc.ca/pgisbJDigital Content Capture Collections/Sub sections/cap scanning images.html#>
Accessed on 3 Nov., 2010.

2.10.3 : Types of digital cameras:

There are following types of digital cameras:

- **Point-And-Shoot:** This type of camera takes an adequately exposed and focused picture, under typical conditions, by pointing the camera at the subject and shooting the picture by pressing the shutter button.
- **Prosumer Camera:** The terms prosumer-camera and bridge-camera are used to describe advanced digital cameras with complete manual controls and high quality fixed lenses. The word prosumer is a contraction of professional and consumer, signifying someone in between. The Word Bridge evokes the same idea as something in between.
- **DSLR:** *“SLR stands for Single Lens Reflex. It means a camera which has a single lens where incoming light is reflected into the viewfinder. This is in contrast with a camera having two lenses, with the second one being used for the viewfinder only. A digital SLR is called a DSLR. The terms SLR and DSLR are probably the most standard terminology because of their obvious definition.”*¹⁰
By their reflex nature, all SLR cameras have an optical viewfinder (OVF). The view from the OVF corresponds to view from the lens except for some slight cropping.
- **Medium-Format Camera:** A medium-format camera, as opposed to a medium-size camera, has a sensor, which is larger than a full-frame sensor. The name comes from film sizes where medium-format films are larger are larger than 35mm films. Just like digital

10. http://www.neocamera.com/feature_camera_types.html

[Demystifying Digital Camera Types Photography Articles, Accessed on 03.11.10]

cameras accepting lenses designed for 35mm film cameras, medium-format digital cameras have a focal-length multiplication (FLM) factor. Since there are several sizes of medium-format films, the FLM will depend on the medium-format being compared.

- **Interchangeable Lens Cameras and Fixed Lens Cameras:** An Interchangeable Lens Camera (ILC) is a camera with an interchangeable lens. The field-of-view and optical zoom of such an ILC depends on the lens attached to it. The term Fixed-Lens Camera (FLC) is used to describe all cameras with lenses that cannot be removed. Since their lens is fixed, FLC have a given 35mm equivalent focal-length range. However, conversion lenses can sometimes be added to widen or narrow their field-of-view.
- **Live-view and other Oddities:** A display, LCD or EVF, previewing the picture before it is taken, is called a live-view. The term live-view camera is sometimes used to describe a camera showing a live-view. It turns out that all camera types can have a live-view, but it is much harder for DSLR cameras because the reflex mirror is in the optical path to the sensor. Also large sensors common in DSLR cameras consume more power and generate more heat than smaller sensors common in live-view cameras.

Digicam is short for digital camera, but some people use this term pejoratively to describe non-DSLR cameras. In summary, even though most terms have clear definitions, they are frequently used in broader ways. The types listed above are not exclusive and some types go hand-in-hand. For example, all point-and-shoot cameras are fixed-lens cameras. Some types are unlikely to be seen together, such as a point-and-shoot medium-format, which would be unlikely to find any buyers.

2.10.4: Technical specifications of digital camera:

There are four main specifications of a digital camera viz, resolution, lens aperture, lens zoom range, lens quality, and software. The CCD sensitivity is also considered while selecting the camera.

Resolution:

Nearly all digital cameras use CCD's as the sensing element in place of the film in conventional cameras. The resolution is defined as the number of pixels in the captured image. Computer images are divided into little dots called pixels. More pixels signifies, more details of the image.

Lens aperture:

The aperture of a lens indicates its maximum opening. The bigger the aperture, the more light is gathered, and the less light you need to take a good photo. This is the most overlooked lens specification, but it very important, especially if you like to take photos indoors without flash or from a reasonable distance.

“Lens aperture is measured in f/numbers, such as f/2.0 or f/3.5. An aperture of f/2.0 literally means that the lens opening is half the focal length of the lens. Thus, smaller numbers mean bigger lens openings.”¹¹

Lens zoom range:

A zoom lens has a variable focal length. The focal length determines the magnification of the lens. A short focal length is a wide-angle lens, great for taking in large vistas. A long focal length is a telephoto lens, allowing you to get a right photo of a distant object or person. A zoom lens lets you combine both of these and everything in between into a single adjustable lens. If a camera has a 3X zoom, it means that the longest focal length is 3 times the shortest.

Lens quality:

Lenses with the same focal length and aperture can differ substantially in quality. A poor lens is not as sharp, and it may exhibit chromatic aberration, which means that all colors are not brought to the same focus. This usually shows up as colored fringes at high contrast edges.

In-camera Software:

This is the software built into the camera. Taking a digital photo requires a fair amount of computation. When the picture is snapped by a digital camera, the camera first grabs a “pre-photo” to determine the brightness and color balance of the scene. It then shoots the real picture, based on the earlier information.

11. <http://www.wfu.edu/~matthews/misc/DiPhotog/start/camera.html/telephoto> setting is f/4.0.

Accessed on 03/11/2010.

Media type:

Most of the state of the art of digital cameras uses Compact Flash or Secure Digital. The difference is not worth worrying about unless it is a good supply of one type. Many Sony and Canon cameras use their own proprietary "memory sticks". It is better to avoid proprietary solutions, as it restricts the future choices considerably. The trend is toward Secure Digital. The market is flooded with many brands of digital camera such as Olympus, Nikon, Canon, Fuji, Sony etc. How to choose a digital camera:

Conclusion:

To have rare documents in archives, there is need to put all the documents in digital format; because there are lots of agencies are available to support libraries and archives centers to convert their rare documents in e-format. If at all we wanted^{to} preserve our national heritage, there is only situation to preserve[^] on digital format. It will remain safe, more accessible, and will readily available for researchers and needy people^{by} 24 x 7.

Hence, while making arrangement for archives in digital format, hardware and software is very important. Selection of hardware will lead to have proper scanning of document and store it at desired place.