

---

---

## Digitisation of Cultural Heritage Information : Requirements for Building a Digital Library

H Suhaimi Bin Abdul Karim

### Abstract

*Digitisation is no doubt the issues that fascinates and haunts preservation managers in archives and libraries at the moment. The possibilities seem limitless, the advantages are obvious, and from all sides there is pressure to exploit the new medium for preservation purposes-sometimes to the extent that funds are earmarked for digitization that previously have been allocated for microfilming or conservation<sup>1</sup>*

**Keywords :** Digitisation, Digital Library, Cultural Heritage

### 0. Introduction

There are several reasons for choosing to digitize heritage information or special collections instead of conventional books:

- Typically, special collection items are unique, so it is more of a service to scholars to put them on the Web than to digitize items, which existed in many copies. Printed works often exist in a library near a scholar; manuscripts or photographs are usually only in one place.
- Special collections items are often fragile, oversize, or otherwise in need of particular care, and as unique items they are irreplaceable, so that replacing their use with the use of some digital surrogate helps with preservation. It can also become much faster to look at them digitally than to browse materials which must be handled slowly and carefully to avoid deterioration.
- Sometimes, special collections materials present fewer copyright problems than conventional materials. A library may have obtained a large amount of material, all of which is controlled by one copyright holder, and been able to obtain permission for the use of the complete collection.

This paper will mainly focus on text and images, as they are the main objects in the digitisation process. It examines the several advantages and benefits of digitization work. The forethought and planning required for developing and integrating digital technology into the digitations are outlined. These includes defining audiences, evaluating assets, object of the project, establishing a management policy for digital assets, defining the audience, evaluating assets, and prioritizing the work. Other important factors that need to be taken into account such as At another level, aspects of standards and guidelines, copyright and legal, sustaining access through preservation, sustainability of any project are described.

### 1. Definitions

Digitisation or digitization is quite simply the creation of a computerized representation of printed analog. It may also refer to all the steps in the process of making available collection of historical material available in digital form. The International Encyclopedia of Information Science<sup>2</sup> defined digitisation as:

“The process of converting analogue information to digital format. In communication this is the process of converting analogue signals to digital signals. In information systems digitization often refers to the process of converting an image (such as photograph or map), using some type of scanning device (or digitizer), into digital representation so that it can be displayed on a screen and/manipulated”

According to Lee<sup>3</sup> digitization is a conversion of analog media to digital form. He went on to say that:

“Digitisation is the creation of a still digital facsimile of a source item such as rare manuscript, photograph, slide, journal, painting, monograph, exam paper, and so on”.

## 2. Digital Library and Digitization

The terms *digitization* (for digital collections) and *digital library* goes hand in hand and the elements that form both concepts cannot be separated. But they are not the same thing. Debate rages among information and knowledge professionals as to what constitutes a digital library and what is digital collection. Digital libraries can be considered as enabling technologies with which to create and manage collection of digital materials so that it can be found and used. In another words it is to make these materials more broadly, quickly and efficiently accessible. The term “digital library” is also often used to describe any multi-media management system holding digitized information, but this does not mean it will deliver true library application functionality. Thus, these digital library components must also be tailored to capture, encode, and deliver information according to the standard practices adopted by the library industry. Because of the rapid pace of technological change, some standards are concrete and others are emerging.

Digital library is seen by Lynch<sup>4</sup>:

“ as the systems that make digital collection come alive, make them usefully accessible, that make them useful for accomplishing work, and that connect them with communities”.

Sun Microsystems<sup>5</sup> defines a digital library as:

“the electronic extension of functions users typically perform and the resources they access in a traditional library”

Digitisation as mentioned earlier, has become one of the key activities in libraries and lead us to understand that it is mainly for the purpose producing numerous large digital collection of materials and databases which are open to exploration and presentation of different directions. Digitisation of heritage material now not only focus on creating large amounts of digital content and providing some fairly simple access tools to material but to learning materials, to the need to package raw content for collections up in various ways such as learning experiences or curated exhibition or interpretation or analysis. The The fully developed digital library environment encompassing among others the content, digitization and acquisition of digital materials are shown in the Appendix 1<sup>6</sup>.

## 3. Why to Digitise ?

Digitization or digital conversion of library and archival materials has advanced at a tremendous pace in the past few years. Libraries have discovered that digital surrogates have certain advantages in offering enhanced access to rare and unique items. The advantages offered by digitization can be generalized under the headings of increasing access, preservation and meeting strategic goals or raising the profile of an institution. For some libraries it is merely with the intention of bringing cultural contents to cyberspace and spread some unknown of history it. Allowing increase access to the object is the most cited advantage of digitization. According to Canadian Heritage Information Network<sup>7</sup>

“ Digital technology have helped Institution’s goal either highlighting particular aspects of local history or reaching national and international audience. Collections that were once too remote to be viewed are now accessible; objects that were once too fragile to be handled or exhibited can now be seen by broad audiences. By making it possible to bring together diverse materials or collections from scattered locations

---

for comparison and research, digital technology can be a powerful teaching aid, especially when institutions work together to create a critical mass of complementary material”

While Lee<sup>8</sup> advocates:

“An electronic facsimile of a page, for example, can be theoretically copied and distributed ad infinitum without any degradation in quality (if correct standards are maintained). More importantly, a single copy can be mounted on a server, this can be viewed and downloaded by large number of users, simultaneously, and from any location in the world (assuming appropriate access restrictions and server technology”

The second advantage of digitization is that it liberates the document from the constraints of traditional methods of access methods. If a manuscript is digitized, for example, traditionally users may only be allowed access to the original item if they show proof that they are genuine researchers with good and validated reasons. Most importantly they would have to physically go to the manuscript itself, which involve travel time and money. But if the digital facsimile was mounted on the webpage and made freely available, everyone can look at the image from the comfort of their own home.

One of the main virtues of digital imaging is its ability to make collections vastly more accessible. Digital technology helps achieve institutional goals, whether highlighting particular aspects of local history or reaching a national or international audience. Collections that were once too remote to be viewed are now accessible; objects that were once too fragile to be handled or exhibited can now be seen by broad audiences. By making it possible to bring together diverse materials or collections from scattered locations for comparison and research, digital technology can be a powerful teaching aid, especially when institutions work together to create a critical mass of complementary material.

Renoult<sup>9</sup> also pointed out:

“The digitization of manuscripts in image and text modes under the guidance of researchers is making important contributions to scientific knowledge. We know for example that this type of research has enabled the recovery of fragments from the pre-Socratic philosophers, which had previously been thought to be lost, and our knowledge of medieval corpus has widened. Closer to the present, erudite work on the texts of Rabelais, Voltaire or William Blake, making use of digital resources, has thrown new light on the works of literature and enabled the transformation of the notion of scholastic text editions”

Digitisation can also aid collections management by increasing all staff members’ or users awareness of the content of their collections, especially if images are linked to the collection management system and networked through the organisation. Sometimes merely selecting objects for digitization provides an additional opportunity to establish and record the condition of artifacts. Digitization also provides an incentive to improve documentation, especially if companion records are to be made public along with the digitized images: The need for standards and enhanced information soon becomes obvious. The funding cuts of the last decade and the need to generate new revenues has caused public programming to overshadow collections management activities

Digital technology can also make available powerful teaching materials for students who would not otherwise have access to them. Among the most valuable types of materials to digitize from a classroom perspective are those from the special collections of research institutions, including rare books, manuscripts, musical scores and performances, photographs and graphic materials, and moving images. Often these items are extremely rare, fragile, or, in fact, unique, and gaining access to them is very difficult. Digitizing these types of primary source materials offers teachers at all levels previously unheard-of opportunities to expose their students to the raw materials of history. The richness of special collections as research tools lies in part in the representation of an event or phenomenon in many different formats.

---

---

#### 4. Benefits of Digitisation

What can be gained from digitization, and whether the value added is worth the price?. The added value of digital capture can be summarised as below:

- enhanced intellectual control through creation of new finding aids, links to bibliographic records, and development of indices and other tools;
- increased and enriched use through the ability to search widely, manipulating images and text, and to study disparate images in new contexts;
- encouragement of new scholarly use through the provision of enhanced resources in the form of widespread dissemination of local or unique collections;
- enhanced use through improved quality of image, for example, improved legibility of faded or stained documents; and
- creation of a “virtual collection” through the flexible integration and synthesis of a variety of formats, or of related materials scattered among many locations<sup>10</sup>.

#### 5. Digitisation Requirements

Building a sustainable digital collections is a complex task involving careful forethought and planning to assure data integrity and acceptable of quality. There are several key factors that need to take into consideration when embarking on a digitization initiative, namely:

- Planning a digitization
- Legal Issues
- Standards and Guidelines
- Sustaining Access through Preservation
- Economics of Digitisation
- Occupational Health & Safety

##### 5.1 Planning a Digitisation

Digitization projects are not cheap, but they should be viewed as a long-term investment for an institution and can yield substantial benefits. Deciding to any digitization project is just like deciding to begin any other type of construction project. While the desire to dive right in and begin building is tempting, any worthwhile endeavour will begin with a thorough planning stage. This planning stage may also be referred to as Document analysis<sup>11</sup> According to Beagrie<sup>12</sup>

“ The initial planning and implementation phases of a digitisation project are widely recognised as being crucial to its eventual success. Many of the decisions made at this time will determine the future sustainability and usefulness of the resources created”

Planning the project needs to take into account the institutional needs, time and resources necessary for the physical preparation of materials to be processed and the development of appropriate documentation to ensure intellectual control. Future requirements should also be considered, so that rapid technological change will not limit future options. Implementing a digitization project in several stages can provide the flexibility to accommodate possible alternatives along the way. The library should begin with a very clear idea of what digitizing the institution’s collection will achieve and how it will further the institution’s goals.

---

Among the key factors that need to be addressed when planning and implementing Digitization projects are as follows :

- Goals of the Project
- Establishing a management Policy for digital assets
- Defining the audience
- Evaluating Assets
- Defining the resources required
- Prioritizing the work

#### 5.1.1 Goals of the project

It is critical to determine the goals and objective of the project in order to make a good decision throughout the project. It is vital to be clear about reasons for embarking on a digitization from the outset. The types of questions that need to be asked and answered are:

- Is the digitization being performed simply to increase access, or to serve some form of archiving/preservation role (or both)?
- Is the digitization being performed to meet institutional strategies (generating income, attracting funding, reducing the burden on staff or budgets)
- Will the digital objects be made accessible widely and freely (e.g. on a stand-alone workstation, or via the World-Wide Web)?
- Are the digital objects (in the case of text or graphics) being made available in order to be outputted to another format (e.g. print, microfilm, etc.)?

#### 5.1.2 Establishing a management Policy for digital assets

Establishing a policy for managing digital assets should be part of the planning process. Just as an institution needs a collections management policy so it should have a policy on creating and managing digital assets, which form a valuable 'collection' of a new kind.

The policy should at least address aspects of copyright and legal policies for staff, management of digital images, methods of documenting content and technical information; planning safe storage, conservation and preservation of master images and surrogate images to ensure their longevity; and digitizing and documenting new objects.

#### 5.1.3 Defining the Audience

In any digitization project, it is important to determine the intended users of the images both inside and outside the organization. Identifying potential internal users will help define the institution's digitization strategies. The project leader should interview staff members, volunteers and others who will use text, images, asking about not only immediate uses, but future ones as well.

#### 5.1.4 Evaluating Assets

A careful assessment of the potential collections to be digitised is needed. Some libraries have thousands of publications, photographs and objects and sometimes it can be difficult to decide which should be digitized first. Having established some of the decision on the collection to be digitised, the nature of the

source documents (the material that is to be digitized) should be considered next. The list of the most common physical attributes that need to be accounted for would be:

- Physical constituency: Paper (matt and gloss), Vellum, Papyri, Microform and other Transparencies (e.g. 35mm slides),
- Physical dimensions: With non-time based media the actual dimensions of the object are extremely important, i.e. it is difficult to digitize large maps or posters using conventional scanning equipment, and this may require creating a surrogate (e.g. a photograph) and scanning from that. With time-based media there is a need to consider length of clip, frame size, frame per second rate.
- Physical robustness: Can the document be disbound, for example? Or is it so valuable or delicate that it needs to be digitized under certain conditions? In addition to the physical attributes the 'content' attributes of the document need to be analysed.
- Content' attributes such as:
  - Text/line art - monochrome documents, i.e. with no tonal variation..
  - Continuous tone - varying gradation in tones, either monochrome (i.e. grey gradations between black and white), or colour. This would cover photographs, works of art, manuscripts, etc.
  - Half-tone - spaced pattern of dots (either monochrome or colour). Used in line engravings and etchings.
  - Artefacts - three-dimensional objects. Texture, shadows, etc., all need to be taken into account<sup>13</sup>

#### 5.1.5 Defining the resources required

Digitisation project will have an impact on budget, staffing, workload, available space and equipment. Staff with the necessary skills will need to be hired or trained (at the least, to document and manipulate the images if the work is contracted out). If existing staff is trained, consider how their ongoing workload will be affected. There are a diverse set of skills required for any digitisation project and often in smaller institutions individuals will need to carry out one or more of the following tasks:

- Project Administration
- Collections management or subject specialists
- Systems support

The different expertises required are among the factors to be considered in any digitisation projects. The different experts that are needed to provide input into the project include subject experts, conservation experts, digital photographers, catalogers, and management and administration.

#### 5.1.6 Prioritising work

Even if the long-term goal is to digitise the entire collection, the project will probably be done over time in accordance with financial and staff constraints. To achieve this, all work needs to be prioritised according to the project plan previously defined.

## 6. Standards and Guidelines

### 6.1 Metadata

The key to locating, using, and preserving digital content is metadata. Many digitisation efforts have been unsuccessful due to inadequate metadata. *Metadata*, literally "data about data," is an increasingly

---

ubiquitous term that is understood in different ways by the diverse professional communities that design, create, describe, preserve, and use information systems and resources. Metadata is one piece of data, which describes another piece of data. In the context of digital resources it is the kind of information that expected to be found in a typical metadata record would be data on the nature of a resource, who created the resource, what format it is held in, where it is held, and so on. Metadata has become a fundamental topic for those concerned with the creation and management of digital resources. It is essential that we understand the critical roles that different types of metadata can play in the development of effective, authoritative, interoperable, scalable, and able to preserve cultural heritage information and record keeping systems. Metadata is the key to discovery, interoperability, accessibility and reuse of digital educational content. It standardizes the descriptive language of digital content, provides consistent descriptive and searchable keywords through ontologies and controlled vocabularies in elements and modifiers, and offers methods for usage and access control through Digital Rights Management systems. The more recent development of metadata standards is in response to the need to deliver digital educational material driven by the network based initiatives to deliver online learning.

Cultural heritage and information professionals such as museum registrars, librarians and archivists are increasingly applying the term *metadata* to the value-added information that they create to arrange, describe, track and otherwise enhance access to information objects. Library metadata development has been first and foremost about providing intellectual and physical access to content. *Library metadata* includes indexes, abstracts, and catalog records created according to cataloging rules and structural and content standards such as MARC (MACHine-Readable Cataloging format), as well as authority forms such as LCSH (Library of Congress Subject Headings). Such bibliographic metadata has been cooperatively created since the 1960s and made available to repositories and users through automated systems such as bibliographic utilities, online public access catalogs (OPACs), and commercial online databases. For archival and manuscript metadata includes accession records, finding aids, and catalog records. Archival descriptive standards that have been developed in the past two decades include the MARC Archival and Manuscript Control (AMC) format published by the Library of Congress in 1984 (now integrated into the MARC format for bibliographic description); the General International Standard Archival Description (ISAD (G)) published by the International Council on Archives in 1994; and Encoded Archival Description EAD), adopted as a standard by the Society of American Archivists (SAA) in 1999.

There are three different types of metadata which are essential to ensure usability and preservation of the collection overtime. They are as follows:

- Descriptive Metadata
- Structural Metadata
- Administrative Metadata

#### 6.1.1 Descriptive Metadata

This metadata provides information that a) allows discovery of collections or objects through the use of search tools, and b) provides sufficient context for understanding what has been found. When collections become large or when searching multiple collections (such as over the Internet) the discovery of objects of interest becomes a “needle in a haystack” exercise. Without agreed-upon metadata standards and the discipline of capturing and storing appropriate descriptive metadata, all but the smallest digital collections would be useless

Metadata for individual objects varies by the type of object, but would include such things as its title, what it is, who created it, contributors, language, when it was created, where it is located, the subject, etc. At the

collection level, users should be able to determine the scope, ownership, any access restrictions, and other important characteristics that would assist in understanding the collection. Probably the best-known descriptive metadata standard for libraries is MARC (MACHINE-Readable Catalog) used for cataloging books and other publications. MARC has served the traditional library well, but was not designed for describing images, sound files, and other new media types. An important emerging descriptive metadata standard for images and other multi-media objects is Dublin Core, a group of 15 items of information designed to be simple to understand and use.

### 6.1.2 Structural Metadata

The second type of metadata is structural metadata. This describes the associations within or among related individual information objects. A book, which consists of pages and chapters, is one of the most straightforward examples of structural metadata. The structural metadata would explain how individual page images make up individual chapters, and how chapters make up the book. There could also be individually imaged figures, and structural metadata could also relate these to chapters or to a list of all figures in the book. Structural metadata aids the user in navigating among individual objects that comprise a compound object.

### 6.1.3 Administrative Metadata

Administrative metadata facilitates access, management, and preservation of the digital resource. It can describe the viewer or player necessary to access the object, automatically opening that viewer or player when a user selects that resource. It can describe attributes such as image resolution, file size, or audio sampling rate. It can provide a record of how and when an object was created as well as archival and rights management information.

An important emerging standard for interoperability of digital collections is the Metadata Encoding and Transmission Standard (METS), which provides a uniform framework for managing and transmitting digital objects. It provides a format for encoding metadata necessary for both management of digital library objects within a repository and exchange of such objects between repositories (or between repositories and their users). Leading academic and research libraries are citing METS as an important standard for digital library interoperability, and seem to be rallying behind this standard.

## 6.2 Legal and Copyright Issues

As libraries increasingly focus on building gateways that direct patrons both to the library's own content and to networked digital resources owned or controlled by other entities, rights management becomes a major concern. With increased use of the internet to buy sell or use of documents and other copyrighted content in a digital form, also the ability to reproduced quickly and with astonishing clarity, more than ever, therefore copyright protection is an issue.

### 6.2.1 Copyright

Copyright protects the expression of ideas that are fixed in any media. It also protects the majority of creations, including literary, dramatic, musical and artistic works, sound recordings and audio-visual works. Before digitising a collection, it is advisable to determine first whether the right to make the digital reproduction has been obtained. Addressing copyright is of critical importance in all digitisation projects and can be one of the obstacles early on. Projects can become mired in the time-consuming process of obtaining copyright clearance and ending up missing critical deadlines. Copyright not only influences what can be digitised or distributed but what can be archived. It is very easy to underestimate the amount of time required for projects to clear rights to allow digitisation to proceed.



---

The duration of copyright protection can differ from country to country. In Canada and Australia, for instance, the general rule is that copyright protection runs for the life of the author plus 50 years. In the United States and the European Union, copyright protection runs for the life of the author plus 70 years. It is also important to note that the laws of the country in which the copyrighted work was created, should always be used to determine its copyright status.

### 6.2.2 Digital watermarking

If digital images to produce high-resolution (quality) images for a website or other digital products are used, a specialised software to protect image copyright are now available in the market. The most common ways to deter people copying images without permission is to add a digital watermark to the image. This kind of technology is particularly useful if images of contemporary artworks are placed on institutional website where we may be required to protect not only the library's copyright, but also the author. Also called digital finger printing, watermarking allows encoding of a subtle or not so subtle mark within a digital file so that when copied the file cannot be altered or the mark removed. Depending on the technology used, this mark can include the name of the copyright owner or their logo, and the trick is to find a way to clearly indicate copyright ownership without impeding the legibility of the image. The digital watermarking software can be expensive and need to carefully assess the real risk against the cost of implementing an effective solution.

### 6.3 Sustaining Access through Preservation

Libraries place high value on preserving the irreplaceable contents of their collections, making the historical and cultural artifacts of our civilization available for future generations. In 1991, the American Library Association published a preservation policy outlining the responsibilities of the library profession for preserving access to information of all forms. In 2001, that policy was updated to reflect changes brought about by the Internet. With digitized resources, it would seem that preservation would be much easier to achieve, especially since an unlimited number of copies can be created of the individual object. There are, however, a number of issues that complicate the maintenance of digital objects over long periods of time:

- Deterioration of media
- Evolution in type and format of media
- Changes in applications and operating systems
- Preservation of processing results

#### 6.3.1 Deterioration of media.

Stone tablets have a considerable advantage over today's digital media for long-term storage. The problem of deterioration limits the useful life of today's digital media to between 5 and 50 years, while librarians debate how to retain the artifacts of our civilization for thousands of years to come.

#### 6.3.2 Evolution in type and format of media.

In addition to the concerns of physical deterioration of media, we must be aware of the challenges posed by changes in media type and format. In the relatively recent history of personal computer use, we have seen an evolution from 5-1/4 " floppy disks to higher density 3-1/2 " diskettes to high-density zip disks, all requiring different physical disk drives and reader software. Optical storage technology is next, and there will undoubtedly be continual change in storage technologies.

### 6.3.3 Changes in applications and operating systems.

New software constantly appears on the horizon, rendering old versions obsolete. The hardware required by applications and operating systems software also changes over time. Any information stored in a given software/hardware environment will eventually be rendered obsolete through technological obsolescence, most likely before deterioration of the actual storage media occurs. Today, locating a system capable of reading 20 year-old Visicalc spreadsheet files or Multimate word processing files is a difficult proposition; in 50 years' time it will likely be impossible.

### 6.3.4 Preservation of processing results.

Some digital resources exist only fleetingly as a program runs and cannot be preserved as static objects. Preservation of such resources requires maintenance of the program and the surrounding operating environment in operable form.

Today, most digital libraries follow a schedule of copying archived digital resources to address the issue of media deterioration. As organizational standards for formats and applications evolve, many libraries also convert the objects over time to maintain readability. The National Library of Australia sponsors an initiative called "Preserving Access to Digital Information" (PADI) with the goal of providing mechanisms that help ensure that digital information is managed with appropriate consideration for preservation and future access. PADI recommends these strategies for long-term preservation of digital collections:

The migration of digital information from one hardware /software configuration to another or from one generation of computer technology to a later one offers one method of dealing with technological obsolescence.

- Adherence to standards will assist in preserving access to digital information.
- Technology emulation potentially offers substantial benefits in preserving the functionality and integrity of digital objects.
- Encapsulation, a technique of grouping together a digital object and anything else necessary to provide access to that object, has been proposed by a number of researchers as a useful strategy in conjunction with other digital preservation methods.
- It is universally agreed that documentation is an important tool to assist in preserving digital material. In addition to the metadata necessary for resource discovery, other sorts of metadata, including preservation metadata, describing the software, hardware and management requirements of the digital material, will provide essential information for preservation.

## 6.4 Business Model

Digitisation represents a substantial investment not only by the host institution or the government or through external funding. It is important therefore to maximise the benefit of this investment both by ensuring that there is a sound business plan for sustaining use of the resource after the initial funding for creation is expended. According to Lynch<sup>14</sup>:

Every digitization project that I know of, every funder of digitization projects that I know of, is acutely sensitive to this issue of sustainability, of trying to avoid the dilemma where we fund the creation of materials that we cannot economically sustain in the long run ..... For primary material, often the main ongoing cost is preserving the digital content and operating access system; for interpretative material we faced all of those costs plus costs of intellectually refreshing the interpretation periodically.

---

The digitisation initiatives may need to explore options to raise external funding and/or utilise external services to reach niche markets. Issues in developing business model may include institutional, funding body, advertising, sponsorship and service charging.

## 6.5 Occupational Health & Safety

The way the workstations design needs to be carefully considered so staff and contractors can work without discomfort or risk of injury.

## 7. Conclusion

Digitisation and digital libraries offer new frontier for libraries and other heritage institutions. With physical libraries, librarians are faced with the physical management and handling of the collection supported by knowledge of traditional preservation and conservation techniques. But with digitized collections and digitization process a new and different approaches are needed to manage and maintained the digital content and electronic services offered. User requirements to the services are different to the conventional one and all of these, need to integrated into the plans and policies of the institution and sectors to maximize its effectiveness.

Information in analog format is different from that of digital, and each has its intrinsic virtues and limitations. Digital will not and cannot replace analog. To convert everything to digital form would be wrong headed, even if we could do it. Digital technology can, indeed prove to a valuable instrument to enhanced learning and extend the reach of information resources to those who seek them, wherever they are, but only if we develop it as an addition to an already well stocked tool kit, rather than a replacement for all of those tools which generations before us have ingeniously crafted and passed on to us in trust.

## 8. References

1. Digitisation as a means of preservation ? European Commission on Preservation and Access, Amsterdam, 1997.
2. Feather, John and Sturgess, Paul (eds)The International Encyclopedia of Information and Library Studies.). London: Routledge, 1997.
3. Lee, Stuart D. Digitisation: is it worth it? In: Computers in Libraries. Vol. 21 (5) May 2001.
4. Lynch, Clifford. Digital Collections, Digital Libraries and the Digitization of Cultural Heritage Information. Keynote address given at the Web-Wise 2002 Conference, March 20, 2002 at Johns Hopkins University. First Monday, 2002 [http://www.firstmonday.dk/issues/issue7\\_5/lynch/](http://www.firstmonday.dk/issues/issue7_5/lynch/)
5. Sun Microsystems. Digital Library Trends, 2002.  
[http://www.sun.com/products-n-solutions/edu/whitepapers/pdf/digital\\_library\\_trends.pdf](http://www.sun.com/products-n-solutions/edu/whitepapers/pdf/digital_library_trends.pdf)
6. Ibid.
7. Canadian Heritage Information Network. Capture your collection : a Guide for Managers Planning and Implementing Digitisation Projects, 2000.  
[http://www.chin.gc.ca/English/Pdf/Digital\\_Content/Managers\\_Guide/managers\\_guide.pdf](http://www.chin.gc.ca/English/Pdf/Digital_Content/Managers_Guide/managers_guide.pdf)
8. Lee, Stuart D. Ibid.
9. Renoult, Daniel. Organising the digitization of collection at a National or International Level: Models for Research Library Development. Liber Quarterly, v.10, pp. 393-403.

10. Smith, Abbey. Why Digitize. Council on Library and Information Resources, February, 1999. <http://www.clir.org/pubs/reports/pub80-smith/pub80.html>
11. Morrison , Alan, Popham, Michael and Wikander, Karen. Creating and Documenting Electronic Texts: A Guide to Good Practice. ISSN 1463-5194.  
<http://ota.ahds.ac.uk/documents/creating/>
12. Beagrie, Neil , Going Digital: Issues in Digitisation for public libraries. An issue Paper from the Networked Services Policy Taskgroup. [http://www.ukoln.ac.uk/public/earl/issuepapers/digitisation.htm#\[2\]](http://www.ukoln.ac.uk/public/earl/issuepapers/digitisation.htm#[2])
13. Stuart D. Lee, Appendix E: Digitisation Methods, 1999.  
<http://www.bodely.ox.ac.uk/scoping/digitisation.html>
14. Lynch, Clifford. Digital collections, digital libraries and the digitization of cultural heritage information. Keynote address given at the Web-Wise 2002 Conference, March 20, 2002 at Johns Hopkins University. First Monday, 2002 [http://www.firstmonday.dk/issues/issue7\\_5/lynch/](http://www.firstmonday.dk/issues/issue7_5/lynch/)

#### About Author

**Dr. H. Suhaimi Bin Abdul Karim** is Senior Librarian and Head of Systems Division at Universiti Brunei Darussalam, Tungku Link, *Brunei Darussalam* and holds BA in Librarianship (Liverpool Polytechnic, Liverpool John Moores University, UK), Master of Librarianship (University of Wales, Aberystwyth) and PhD (Loughborough University, UK). Currently he is heading two e-government projects namely Virtual Library Information System of Brunei Darussalam (VILIS Brunei) a national flagship project for the Ministry of Education, and the e-library@ubd project of Universiti Brunei Darussalam. He is also involved with the Digital Library Project at the State Mufti's Department Library. He is the General Secretary of the Brunei Darussalam's Library Association and Member of UBD Information Technology Technical Committee, and the UBD Marketing Committee.

**E-mail : [suhaimi@lib.ubd.edu.bn](mailto:suhaimi@lib.ubd.edu.bn)**