MINERVA

Ministerial Network for

Valorising activities in digitisation

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Minerva Project Best Practice Handbook

Document Overview

This document is a result of the Minerva project's best practice working group. It presents a practical handbook to the establishment, execution and management of digitisation projects, with particular focus on the cultural area (libraries, museums, archives). The target audience of this handbook is teams within and across cultural institutions who are contemplating, or are already executing, digitisation projects. The document reflects the outcome of the work carried out by WP6 of the Minerva project, including the substantial research represented by the National questionnaires completed at the National Representatives Group (NRG) meeting in Alicante, May 2002.

Document Structure

This document has the following elements :

- Background
- Practical Guidelines
- Relevant Standards
- Contact Points
- Appendix A : Source Material

Background

This reviews the relevant aspects of the Minerva project, and states the role of this document in the overall progress of the project. It also covers the work carried out to date, in order that the reader shall have a clear picture of the context in which this document should be considered.

Practical Guidelines

The most important practical lessons learnt and information collected by the Minerva project best practice team are presented. This focuses on a significant number of practical 'rules of thumb ' which should be considered by organisations which are establishing, executing or managing digitisation projects in the cultural sphere. The guidelines are divided into the following areas, each of which reflects a stage in the life-cycle of a digitisation project :

- Digitisation project planning
- Selection
- Intellectual Property and Copyright
- Preparation for Digitisation
- Handling of Originals
- The Digitisation Process
- Preservation of the Digital Master Material
- Meta-data
- Preparation for Publication
- Online Publication

- IPR and Copyright
- Project Management

The guidelines are presented in a pragmatic manner, aimed at the hands-on project team, and are supported by relevant references to examples of best practice, competence centres and role models which are being carried out in the European cultural field, as well as by global links to appropriate and useful online resources.

It may be noted that there are several other sources of guidelines on digitisation and the creation of digital cultural content. These include work by the PULMAN project at http://www.pulmanweb.org/DGMs/section3/digitisation.htm, the comprehensive TASI site at www.tasi.ac.uk, IFLA also publishes a set fo guidelines at www.ifla.org/VII/s19/pubs/digit-guide.pdf Kenney and Rieger's *Moving Theory Into Practice: Digital Imaging for Libraries and Archives.* (http://www.library.cornell.edu/preservation/tutorial/contents.html). is also very useful

However, the target groups of this document and those mentioned above are different, with this document having a specifically European focus.

Standards

An overview of the relevant technical standards is provided in a separate section. The Minerva team recognise the wide range of standards available, and have not attempted, in this document, to cover any except the most important. The major focus is on technology standards which impinge on the decisions which need to be made during a digitisation project, and include standards in the following areas:

- Image
- Audio
- Digital Video
- 3D
- Meta-data
- Taxonomy and Naming

Contact points

A list of organisations with digitisation experience and existing projects is provided. This identifies projects nominated by the Minerva partners which can be expected to have expertise in a particular part of the digitisation life-cycle. An effort has been made to provide contact points in each country, whenever feasible. In addition, a selection of the most important international projects and online resources is provided for each areas. This material should assist project teams who wish to find other projects in their own country or their own subject area or language domain, which have similar objectives.

Source Material

The **appendices** to this document include the material collected at the Alicante meeting (a list of nominated examples of best practice provided by each of the project partners) This material is also cross-referenced within the document.

Background

The Lund Principles

On 4 April 2001, representatives and experts from the Commission and Member States met at Lund in Sweden (under the Swedish Presidency)to discuss how to coordinate and add value to national digitisation programmes, at a European level. The meeting resulted in the publication of a set of general principles to govern public digitisation initiatives and their coordination. These contributed to an Action plan of steps to be taken to improve the digitisation landscape across Europe.

Minerva

This document is an output of the **Minerva** project. The Minerva project was established in 2002 under IST contract 2001-35461, under the leadership of the Italian Ministry of Culture. The project comprises representatives of the relevant government ministries or central state agencies from many EU member states, with the common objective of promoting a shared approach and methodology for the digitisation of European cultural material. The project recognises the unique value of the European cultural heritage, and the strategic role which it can play in the growing digital content industry in Europe. It also recognises the value of coordination of the efforts of national governments and cultural organisations, in order to increase the level of synthesis and synergy between and among digitisation initiatives.

The project has a number of focused **working groups** within the overall consortium. Each working group is made up of several project partners, working together on a particular aspect of the project objectives. The objectives of each working group are described on the project web site at http://www.minervaeurope.org The working group structure allows the project to examine a number of the most important areas of the digitisation sphere, in parallel.

The following working groups exist within the project :

- Benchmarking framework
- Identification of good practices and competence centres
- Interoperability and service provision
- Inventories, discovery of digitised content, multilingualism issues
- Identification of user needs, content and quality framework for common access points

Each working group is responsible for a project work-package, as outlined in the project plan. The activities of the working group include meetings, public workshops, publications (such as this handbook), international coordination and cooperation, etc.

Minerva Addresses the Lund Action Plan

The Minerva project is made up of representatives EU member states, who are dedicated to the following objectives :

- co-ordination of their strategies and policies for digitisation of cultural content;
- provision of a European dimension to their policies and programmes;
- definition, exchange and dissemination of digitistaion good practices across the European Union;
- support of the development of national and international inventories of cultural and scientific content.

The Minerva project is made up of representatives of national governments or central state authorities given the task , thus providing leadership from the highest level. It also includes major national cultural players such as national libraries and museums. The project aims to co-ordinate national programmes, and its approach is strongly based on the principle of embedded ness in national digitisation activities.

The **work plan** of the Minerva project includes activities to:

- organise work groups to provide the political and technical framework for improving digitisation activities of cultural and scientific contents, and defining a common platform;
- facilitate the adoption of the Lund principles, both in EU Member States and other European countries, to amplify the impact of the eEurope initiative;
- set-up an international Forum, and electronic publication, supporting collaboration on scientific research;
- make visible, promote and exchange information about National Policy profiles concerning digitisation;
- identify users' needs, define training schemes and develop recommendations;
- make available test-beds, defining mechanisms for evaluating models, methodologies, techniques and approaches, aiming at the selection of guidelines for harmonising activities and trying to reach agreement among Member States, on a common basis;
- implement the benchmarking framework on digitisation, able to compare and improve quality of national approaches and promote best practice across Europe;
- organise a plenary meeting every six months, hosting also thematic workshops to present and discuss results achieved by the specific work groups;
- promote concertation events open to both EU and other national projects, to create clusters of projects;
- promote dissemination and training activities at national level, acquisition of new skills and access to existing resources;

- identify Road Maps suitable for activities to be launched in the near future, to support Member States in the definition of their policy, through exchange of experience, priorities agenda and work programmes.

The direct involvement of governmental organisations intends to contribute at bringing together a wide network of research centres, cultural organisations and companies interested in digitisation aspects, to co-ordinate their activities in order to advance towards common strategic goals.

The Role of this Document

This handbook document is an interim output of the best practice task force. This document contributes to the achievement of objectives of the project by providing a concrete, pragmatic output from the deliberations of the project, which will allow the benefit of the knowledge and research within the project to be capitalized upon by the widest possible audience. This handbook is aimed at cultural bodies contemplating or involved in digitisation projects, as well as at the stakeholders in the developing European content industry.

This document presents a first harvest from the research carried out to date within that task force, in the form of an easy-to-use and pragmatic set of guidelines for digitisation projects. The handbook makes available the results of the work carried out so far, in a timely manner, and allows third parties to benefit as soon as possible from the work of the project. It also underlines the practical, real-world applicability of the work of the project, and its relevance to its target audience.

It may be noted that there are several other documents available, which share scope with this document. A range of Internet sites (TASI, AHDS, NOF-Digitise, Colorado Digitisation, to name a few) provide large amounts of information regarding best practice for digitisation projects.

Work to date

This document is one of a series of outputs from the best practice work-package of the Minerva project. The work-package (WP6) has already published a deliverable (state of the art report) describing best practice and competence centres (D6.1), and is on course to establish appropriate web architectures for digitisation projects. The work carried out includes background research across the world on digitisation projects and on sources of knowledge and guidance which may be of relevance. Several of these are referenced in this document, as well as in D6.1. In addition, all cultural ministries in the EU have provided nominations of projects, competence centres and initiatives, in their home countries, which are examples of good practice in one or more areas. This material (presented in its original form in Appendix A), provide a unique insight into ongoing work within each member state.

Practical Guidelines

Introduction

This section presents the core of the handbook. It provides practical guidelines for organisations and bodies contemplating, or involved in, digitisation projects. The emphasis is on the cultural sphere, however the material is to a large degree relevant to other spheres (e.g. tourism, general document management).

This material in this section is broken down in accordance with the stages in the digitisation life-cycle. This means that a reader can easily identify material which is relevant to his work, regardless of how far his own project has progressed. It is anticipated that many users of this handbook will be at the first stage of the project (planning), however, at least some of the material provided here should be of value to any digitisation project.

The digitisation life-cycle stages identified here, and used as the basis for the breaking down of the guidelines, are as follows

Life Cycle

Digitisation project planning

The reasons for the project
Resources
Research

Selection

Establishing Selection Criteria
Selecting against those criteria

Preparation for digitisation

Hardware
Software
Environment

Handling of originals

Choice of digitisation hardware
Appropriate movement and manipulation of original material
Staff Training

The digitisation process

Scanning
Photography
Optical Character Recognition

Preservation of the digital master material

File formats
Media choices
Migration strategies

Meta-data

The scope of the meta-data used (what is being described).
Appropriate standards

Preparation for publication

Image processing (file format, colour depth, resolution)
3D and Virtual Reality Issues

Online publication

Web Site Creation

IPR and Copyright

Establishing Copyright
Safeguarding Copyright

Project Management

Digitisation process management
Training and team development
Working with third parties (technical assistance)
Working with third parties (cooperative projects and shared content)

Each guideline description is made up of the following elements

- A Guideline Title
- An Issue Definition, which sets the scene for the guideline and/or introduces the problem which the guidelines addresses
- The Guideline Text, a set of pragmatic suggestions which aim to facilitate the relevant aspect of setting up or executing a digitisation project
- Notes or Commentary, where any additional information is provided. This is sometimes empty
- References, which are broken into two parts –
    - Online References, usually links to competence centres and their publications, which address a particular issue explicitly
    - References Nominated by Minerva Partners, links to projects which are listed in Appendix A. These projects may or may not address the particular area explicitly; the link is provided either because the project can be expected to have experience in a particular area, or because it addresses this area in detail.

Neither the guidelines nor the references is exhaustive – however they provide the most important information needed by a project which is addressing a particular task or tasks within the life-cycle of a digitisation project.

Digitisation Project Planning

Introduction

The planning of the project is the first step in any digitisation project. Time spent on planning the project will pay dividends in the easier management and execution of the project. A digitisation project should have clearly specified goals and objectives – these will impact directly on areas such as selection, copyright and publication. The project should have suitable personnel, with appropriate knowledge and skills, as well as a training plan in place to provide any additional expertise that the project may require.

A project should not begin until some research has been carried out into other projects in the same area. Such research will identify issues which need to be addressed, will stimulate new ideas and areas which might not yet have been considered, and will add value and credibility to the project output.

Research will also help to indicate the amount of work which may be planned for the execution of the project, by meeting or talking with organisations which have completed similar projects. Such interactions will help to establish whether your organisation has the personnel, the skills and the technology infrastructure to carry out the project, or whether significant training and preparation will be required.

Some time may profitably be invested in ascertaining the copyright status of the material which is to be digitised. Failure to secure permission to digitise and to publish on the web can cause the failure of a digitisation project, despite any technical expertise and experience.

A technical pilot may also be considered, at the start of the project, in order to ensure that any anomalies or problems with the technical workflow are resolved before commencing the main project.

Guideline Title

The Reasons for the Project

Issue Definition

Each digitisation project has its own reason for being executed. Often, the reasons involve providing access over the Internet to cultural holdings which would otherwise be underused, or protecting fragile holdings from the wear and tear of hands-on access. In other cases, the projects are exercises in inter-body cooperation, and involve the establishment of portals, networks, etc.

The reasons for the project will have a profound effect on the criteria for selecting the material to be digitised. They will also affect the project management, the meta-data, the online publication (if any) of the project output, the quality control etc. 'Why' is the most important question to raise before starting a digitization project.

Guideline Text

- The project must have concrete, explicit aims.
- These aims must be documented.
- The aims of the project should be realistic, when compared with the resources available.
- All steps of the project should be validated against these aims, in order to ensure that work carried out in the project contributes towards the achievement of the guidelines.
- The project aims should document the value which the project will bring to the institutions involved in the project. If time and effort are to be invested in the project, the justification for the project, from an institutional point of view, must be clear.

Notes/Commentary

References

Online

- NOF-Digitise Technical Advisory Service Manual : http://www.ukoln.ac.uk/nof/support/manual/

- Arts and Humanities Data Service : http://www.ahds.ac.uk
- American Memory : http://lcweb2.loc.gov/ammem/ftpfiles.html
- Council on Library and Information Resources (CLIR) : http://www.clir.org/pubs/reports/reports.html
- Sun Microsystems Digital Toolkit : http://www.sun.com/products-n-solutions/edu/libraries/digitaltoolkit.html
- Guides to Quality in Visual Resource Imaging : http://www.rlg.org/visguides/ (esp. Guide 1 – planning).
- US National Digital Library Programme Project Planning Checklist : http://lcweb2.loc.gov/ ammem/prjplan.html
- Planning Your Digitization Project : www.infopeople.org/training/past/2001/digitization/Agenda.pdf
- An Introduction to Digital Projects for Libraries, Museums and Archives, http://images.library.uiuc.edu/resources/introduction.htm

Nominated by Minerva Partners

- **France :** National digitisation programme - annual project calls : http://www.culture.gouv.fr/culture/mrt/numerisation/index.htm
- **Greece :** ODYSSEUS : http://www.culture.gr
- **Ireland :** ACTIVATE : http://www.activate.ie
- **Italy :** *Diplomatico :* http://www.archiviodistato.firenze.it/progetti/attivite.htm
- **Italy :** Rinascimento Virtuale -Digitalepalimpsest Forschung (RV) : www.iccu.sbn.it , www.bml.firenze.sbn.it
- **Portugal** : Endovelliccus : www.ipa.min-cultura.pt
- **Portugal :** MatrizNet : http:// www.matriznet.ipmuseus.pt
- **Sweden** : The Oxenstierna Project. : http://www.ra.se/ra/Oxenstierna/oxenstierna1.html
- **UK :** Compass : http://www.thebritishmuseum.ac.uk/compass
- **UK :** NOF-Digitise Technical Advisory Service Manual : http://www.ukoln.ac.uk/nof/support/manual/

Guideline Title

Resources

Issue Definition

Before a project can start, it is important that the personnel required to work on the project be available. Many cultural bodies do not have large corps of staff who have a great deal of free time to carry out digitisation projects, over and above their usual duties. Also, the knowledge requirements for digitisation projects may be different to those for the performance of the usual tasks of available personnel.

Guideline Text

- Ensure that sufficient staff are available to carry out the project.
- Assign staff to each task or work-package of the project plan.
- Identify training requirements, including information technology training and education in the handling of delicate artifacts and documents.
- Carry out training using the hardware and software solution which will be used during the project, before the project commences.
- Aim for a small core of skilled staff dedicated to the project, rather than a large group of 'occasional' staff.

Notes/Commentary

While the material presented in this guideline is common to all project management scenarios, it is worth repeating, particularly since there is possible risk to irreplaceable artifacts and documents if the resourcing is not properly handled.

References

Online

- **Canadian Heritage Information Network : Planning your digitisation project : http://www.chin.gc.ca/English/Digital_Content/Small_Museum/planning.html**
- **Colorado Digitisation Programme : Questions to Ask :** http://www.cdpheritage.org/resource/ introduction/questions.html
- **Library of Congress**, National Digital Library Program NDLP Project Planning Checklist at http://lcweb2.loc.gov/ammem/prjplan.html
- **NOF-Digitise** Technical Advisory Service Manual : http://www.ukoln.ac.uk/nof/support/manual/ has sections on Resourcing, job specification, recruitment, etc.

Nominated by Minerva Partners

- **Denmark :** "The soldier in the Backyard – an interactive children's story on the Internet" **:** http://www.soldatenibaghaven.dk (especially multi-partner projects)
- **Spain** : Virtual Sites Re-creation : www.patrimonionacional.es (especially multi-partner projects)
- **France** : INA digitisation programme of National Audio-Visual Archives.: http://www.ina.fr/index.en.html
- **France :**National digitisation programme - annual project calls : http://www.culture.gouv.fr/culture/mrt/numerisation/index.htm
- **Ireland** : ACTIVATE : http://www.activate.ie (includes methodology guides and templates)

Guideline Title

Research

Issue Definition

Regardless of the scope of any particular project, some similar projects will have been carried out in the past. There is a strong likelihood that information about such projects will be available on the Internet, or else published in appropriate journals, etc.

Researching the area as part of the project planning process can help to identify candidate hardware and software solutions, to plan workflow and process, and the avoid issues and obstacles which have been experienced by other projects.

Guideline Text

- As early as possible in the planning process, carry out research into any other projects which are addressing similar issues to the project being planned. This handbook provides a starting point; however the amount of material available on the Internet is the largest and most comprehensive resource.

- Research helps to avoid the making of the same mistakes as other projects. It can also put the project team in contact with others who have completed similar projects, and gives the opportunity to learn from their experiences.

- Having carried out research adds credibility and value to the output of any project. Assurance that your project has not been carried out in a vacuum, and takes into account the work of others, enhances the results of your project.

Notes/Commentary

Many cultural digitisation projects are funded with public funds, and have a requirement to publish their findings and their reports. Such publication is almost always on the Internet, as well as using other appropriate media.

Project teams are usually very happy to share their experiences and their results – this adds value to their work.

References

The following references include some of the nominated projects who may be in a position to assist in the targeting of background and pre-project research.

- **Belgium** : Culturenet Flanders
- **Spain** : Biblioteca Virtual Miguel de Cervantes (Miguel de Cervantes Digital Library) : http://cervantesvirtual.com/

- **France** : INA digitisation programme of National Audio-Visual Archives.: http://www.ina.fr/index.en.html
- **France :**National digitisation programme - annual project calls : http://www.culture.gouv.fr/culture/mrt/numerisation/index.htm
- **Greece :** ODYSSEUS : http://www.culture.gr
- **Italy :** Rinascimento Virtuale -Digitalepalimpsest Forschung (RV) : www.iccu.sbn.it , www.bml.firenze.sbn.it
- **Sweden** : The Oxenstierna Project. : http://www.ra.se/ra/Oxenstierna/oxenstierna1.html

Selection

Introduction

The selection of the material to be digitized is an important decision for any digitisation project. Typically, the ideal choice is to digitize all the material in a collection or holding; however, this is rarely feasible, so choices must be made. The **criteria** for selection will differ, depending on the goals of the digitisation project; an online resource for schools may choose to digitize material in line with a syllabus, while a museum may digitize its best-known holdings in order to stimulate visitor numbers, or its most fragile artifacts in order to minimize demand for 'hands-on' examination. These are of course not the only issues to be addressed in the selection criteria – the reasons for choosing to digitise particular material will vary from project to proposal, as will the reasons for deciding not to digitise. Examples of other reasons include legal constraints, institutional policies, technical difficulty of digitisation, already-extant digital copy, etc.

Guideline Title

Establish Selection Criteria

Issue Definition
When planning a digitisation project, the choice of **which** material to digitize is critical. The criteria for selection will depend on the goals of the project, as well as on technical and financial constraints, copyright and IPR issues, and the activity of other projects in the area.

Guideline Text

- It is essential to establish criteria for the selection of material to be digitized. The selection criteria must reflect the goals of the project overall. At least the following criteria may be considered
  - Access to material which would otherwise be unavailable, or of limited availability
  - Wider and easier access to very popular material
  - Condition of the originals.
  - Preservation of delicate originals, by making digital versions available as an alternative
  - Project theme
  - Copyright and IPR
  - Availability of existing digital versions
  - Cost of digitisation
  - Appropriateness of the source material for online viewing

- The criteria for selection should be explicit and discussed with, and endorsed by, all relevant stakeholders, prior to selection or digitisation.

- The selection criteria should be fully documented (in the knowledge base), so that the reasons for any decisions to digitize or not to digitize are clear throughout the project.

Notes/Commentary
Most commonly, cultural bodies have a core of high-value, high-user-interest material which is, by default, included in any digitisation project which is meant to represent the institution.

A large proportion of all digitisation projects have online web publication as a goal. This means that the copyright and IPR issues which surround any material which may be digitized must be considered before selection.

References

Online

- **RLG/NPO Guidelines and Selection Criteria : http://www.rlg.org/preserv/joint/selection.html**
- Columbia University Libraries Selection Criteria For Digital Imaging : http://www.columbia.edu/cu/libraries/digital/criteria.html
- Selection Criteria for Digitization Projects : www.wils.wisc.edu/events/dgtdev/present/maritime.doc
- Brown University Library Selection Criteria for Digitization : http://www.brown.edu/Facilities/University_Library/digproj/digcolls/selection.html
- Old Dominion University : Selection Criteria For Digitization : http://www.lib.odu.edu/services/dcenter/digselection.html

Nominated by Minerva Partners

- **Denmark** : Kongens Kunstkammer (Royal Chamber of Art) **: http:** //www.kunstkammer.dk
- **Ireland :** ACTIVATE : http://www.activate.ie
- **Italy :** *Diplomatico :* http://www.archiviodistato.firenze.it/progetti/attivite.htm
- ***Italy :*** *Mediceo avanti il Principato on line:* http://www.archiviodistato.firenze.it/Map/
- **Italy :** Rinascimento Virtuale-Digitalepalimpsest Forschung (RV) : www.iccu.sbn.it , www.bml.firenze.sbn.it
- **Sweden** : The Oxenstierna Project. : http://www.ra.se/ra/Oxenstierna/oxenstierna1.html
- **UK :** Compass : http://www.thebritishmuseum.ac.uk/compass

Guideline Title

Selection Against the Criteria

Issue Definition
Having established the criteria against which material is selected to be digitized, the actual selection process must take place. This guide suggests how this may be managed

Guideline Text

- Each candidate for digitisation must be evaluated against the selection criteria. In the event that any selection criterion is not met, this should be noted. In the event that this results in the rejection of important or critical objects, it may be necessary to review the selection criteria. Should this occur, the new criteria should be noted.

- Once an object has been selected for digitisation, its details should be entered into a **digitisation management knowledge base**. This database is used to track the object through the digitisation process, and enables the status of the project to be reviewed at any time. This knowledge base may take the form of a database (e.g. in MS Access, Oracle, MySQL, etc), or may use a simple spreadsheet or even a collection of documents. The important issue is not the format of the knowledge base, but the process which ensures the recording of actions which are carried out.
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Notes/Commentary
At this stage, the project is engaging with each of the items to be digitized, for the first time. This is the optimum opportunity for the project to create a knowledge base of all the items in the scope of the project. Having such a knowledge base will ease the management of the project, and help to ensure that, for example, the appropriate expert knowledge is acquired for handling rare artifacts, as well as more mundane issues such as the location of originals

References
Online

- RLG/NPO Guidelines and Selection Criteria **:** **http://www.rlg.org/preserv/joint/selection.html**
- Columbia University Libraries Selection Criteria For Digital Imaging : http://www.columbia.edu/cu/libraries/digital/criteria.html
- Selection Criteria for Digitization Projects : www.wils.wisc.edu/events/dgtdev/present/maritime.doc
- Brown University Library Selection Criteria for Digitization : http://www.brown.edu/Facilities/University_Library/digproj/digcolls/selection.html

- Old Dominion University : Selection Criteria For Digitization **:** http://www.lib.odu.edu/services/dcenter/digselection.html
- UK : Library and Information Commission 'Full Disclosure' report at http://www.ukoln.ac.uk/services/lic/fulldisclosure/

Nominated by Minerva Partners

- **Denmark** : Kongens Kunstkammer (Royal Chamber of Art) **:** http**://**www.kunstkammer.dk
- **Italy *:*** *Diplomatico* **:** http://www.archiviodistato.firenze.it/progetti/attivite.htm
- **Italy *:*** *Mediceo avanti il Principato on line***:** http://www.archiviodistato.firenze.it/Map/
- **Sweden** : The Oxenstierna Project. : http://www.ra.se/ra/Oxenstierna/oxenstierna1.html

Preparation for Digitisation

Introduction

An appropriate environment and hardware/software system must be in place before digitisation can begin. The elements of such an environment include hardware for the digitisation process itself (e.g. scanners, digital cameras, copy stands, other hardware), a computing infrastructure to which the hardware is connected, image processing software, a digitisation management knowledge base software package, etc. The working environment should be appropriate to the material being digitized, with care taken, for example, with light, humidity, vibration, disturbance, movement of the originals, etc.

Guideline Title

Hardware

Issue Definition
The appropriate technical equipment must be in place for the digitisation to go ahead. Typically this will consist of data capture equipment (digital cameras, scanners, audio and video hardware, if appropriate) harnessed to a computing platform, often a PC with substantial storage and memory.

Guideline Text

- Appropriate hardware must be installed **before** digitisation begins.

- No source material should be present until the hardware environment has been fully established and tested with non-sensitive materials.

- Most digitisation projects will require a flatbed scanner, for material which is not harmed by being pressed flat against a hard surface (e.g. unbound printed material and manuscripts).

- The largest possible scanner should be acquired by the project. The folding or mosaic-ed scanning of materials should be avoided. The project should bear in mind that the transportation of large (e.g. A0) scanners is not trivial.

- Scanning should be carried out at the highest reasonable resolution. This will result in very large master files; smaller files can be created from the master, for purposes such as web delivery. However, a higher-quality image can never be derived from a lower-quality image.

- The definition of a 'reasonable' resolution will depend on the nature of the material being scanned, and on the uses to which the scanned image will be put. For example, if the scanned images are only ever to be used as thumbnails, this can allow scanning at a low resolution. Equally, the resolution must capture the most significant details of the item – if scanning at a high resolution yields no more information that at a lower resolution, the high resolution scanning is difficult to justify.

- Scanning should create a file format which is loss-less, i.e. not compressed. Typically, the Tagged Image File Format (TIFF) is used.

- Most digitisation projects will require a digital camera, for capture of material which cannot be flattened or held on a scanner book cradle.

- The most powerful and flexible camera which the project can afford should be used. The limitations of the digitisation hardware cannot be overcome by any subsequent processing. It should be noted that 'digital zoom' does not provide a better quality picture, it merely displays less pixels per unit of view. In order to capture detail, two parameters are most important – the number of pixels in the image (typically three to ten million) and the optical lens being used.

- Digital photography should be carried out at the highest possible resolution. This will result in very large master files; smaller files can be created from the master, for purposes such as web delivery. However, a higher-quality image can never be derived from a lower-quality image.

- Digital photography should create a file format which is loss-less, i.e. not compressed. Typically, the Tagged Image File Format (TIFF) is used.

- It is important to have appropriate stands for holding material while it is being photographed.

- The photographic plane and the plane of the material being photographed must be exactly parallel, if the image is not to be distorted.

- Appropriate lighting must be part of the photographic set-up; it is very rare for ambient light to be sufficient.

- Suitable filters should be used in order to reduce colour distortion.

- Since the memory capacity (if any) of digitisation devices is usually limited, a computer with significant storage should be connected to the devices. This computer should be backed up very regularly – this requirement reflects the high costs in time, technology and possible wear on the originals, of the digitisation process.

Notes/Commentary

The hardware used is a major constraint on the quality of the end result of any digitisation project. Unless the project is digitizing only flat materials which can be scanned without damage to bindings, frames or the source material itself, the use of a digital camera will be important. While an analog camera can be used, and the slides or prints scanned, the advantages in terms of time, effort and quality of a high-specification digital camera are many.

If the project has a limited life-span, the hire of suitable digital camera hardware may be appropriate. Another alternative is the use of external agencies to carry out the digitisation on behalf of cultural bodies involved in the project.

References

Online

- The comprehensive tasi site has a section on hardware and software for digitisation projects at http://www.tasi.ac.uk/advice/creating/hwandsw.html

- The University of Arizona has a substantial amount of online guidance, including hardware and software, at http://www.dlapr.lib.az.us/digital/dg_a3.html

- The Colorado Digitisation Program includes hardware in its list of guidelines at http://www.cdpheritage.org/resource/scanning/std_scanning.htm

Nominated by Minerva Partners

- **Austria** : www.bildarchiv.at. (special digital photography setup)
- **Ireland :** ACTIVATE : http://www.activate.ie
- **Italy :** DADDI **:** http://www.uffizi.firenze.it/Dta/daddi-eng.html
- ***Italy :*** *Diplomatico* ***:*** http://www.archiviodistato.firenze.it/progetti/attivite.htm
- **Potugal** : Endovelliccus : www.ipa.min-cultura.pt
- **Portugal :** MatrizNet : http:// www.matriznet.ipmuseus.pt
- **Sweden** : The Oxenstierna Project. : http://www.ra.se/ra/Oxenstierna/oxenstierna1.html
- **UK :** Compass : http://www.thebritishmuseum.ac.uk/compass

Guideline Title

Software

Issue Definition

Having created a digital version of the object, the resulting file is likely to require processing before it can be used. Colour may need correction, extraneous detail may need to be cropped (removed) from the edges of the image, etc. Also, the master files are typically very large, so a smaller file in a compressed format will often be needed (e.g. as a thumbnail image, or for web delivery).

Guideline Text

- Suitable image processing software will be needed to utilize the master files for whatever the purpose of the digitisation project may be. While digitisation hardware will typically be provided with some software included, this is usually not of sufficient power and flexibility for many projects.

- The requirements on the software depends on the aims of the project. It is worthwhile to note that, once the master files are not modified in any way, various different types of software can be used to process them. However, the cost in time and effort may be significant, and will usually overshadow the cost of a more powerful software package.

- The project should acquire the most appropriate and powerful software package which it can afford, and install it on as powerful a computer as is available.

- As an absolute minimum, the software must be capable of
  - opening very large image files
  - modifying the resolution and the colour depth
  - saving multiple different versions, in different file sizes.
  - selecting and copying a part of the image, and saving this as another file.
  - exporting images in different file formats, including the web standards JPEG and GIF.

- Several free software packages provide this level of functionality; however investing in a commercial product is likely to pay dividends in time, effort, documentation and technical support.

OCR Software

In the event that the digitisation project has a OCR component, the choice of software is also critical. Any OCR exercise has a certain amount of manual editing and correction; the manner in which this is supported by the software product in use can have a significant effect on the time and effort required by the project. Better OCR packages

may enable review and editing on a single screen, suggest possible corrections for mis-read words, support the use of multiple text columns (e.g. newspaper layout), etc.

The evaluation of multiple OCR packages is likely to be worthwhile, if the project exceeds, for example, one person-year in size.

Notes/Commentary

The right software will save a digitisation project a large amount of time and effort. If the project is of significant duration (e.g. more than two persons for more than six months), evaluation of several software packages may be worthwhile, in order to establish the best match for the requirements of the project.

References

Online

- The comprehensive tasi site has a section on hardware and software for digitisation projects at http://www.tasi.ac.uk/advice/creating/hwandsw.html
- The University of Arizona has a substantial amount of online guidance, including hardware and software, at http://www.dlapr.lib.az.us/digital/dg_a3.html
- The Colorado Digitisation Program includes hardware in its list of guidelines at http://www.cdpheritage.org/resource/scanning/std_scanning.htm

Nominated by Minerva Partners

- **Ireland :** ACTIVATE : http://www.activate.ie
- **Italy :** DADDI **:** http://www.uffizi.firenze.it/Dta/daddi-eng.html
- **Italy** ***:*** *Diplomatico* ***:*** http://www.archiviodistato.firenze.it/progetti/attivite.htm
- **Portugal :** MatrizNet : http:// www.matriznet.ipmuseus.pt (Matriz is a museum management software solution).
- **UK :** Compass : http://www.thebritishmuseum.ac.uk/compass (project includes significant software development)

Guideline Title

Environment

Issue Definition

Many rare or delicate materials require a particular environment. It is critical to any digitisation project that the digitisation process have the minimum negative effect on the source materials. An appropriate digitisation environment is important to many digitisation projects.

Guideline Text

- The environment in which digitisation takes place is of considerable importance.

- Expert opinions should be sought in order to ensure that all aspects of handing of original material are addressed as well as possible. These include the environment for digitisation.

- The area used for digitisation should be dedicated to the digitisation project for the duration of the project. Excessive movement, rearrangement etc of the workspace can lead to damage, loss or other negative effects on the source materials, as well as to loss of time by the project.

- Ideally, the computing infrastructure used for digitisation should also be dedicated to this task, in order to avoid any possible issues with loss of digitized data. As noted above, the storage should be backed up regularly (i.e. at least daily).

- If the source materials have particular requirements in terms of light, humidity, etc, then these should be replicated as closely as possible in the digitisation environment. For certain materials, such as leather documents, a short-term increase in humidy may assist in relaxing the materials prior to flattening for photography or scanning.

- In almost all cases, direct exposure to bright light (e.g. sunlight) for extended periods is not recommended. Smoking, eating and drinking in the vicinity of the items should of course not be permitted – keep coffee away from the work area !

Notes/Commentary

Depending on the size and budget of the project, a dedicated digitisation environment may not be feasible. However, the aims outlined here, to minimize movement, disruption and handling of the materials, should be kept in mind.

As with the handling of heritage material, no references should be taken as a substitute for discussion with those whose responsibility includes the care of the material.

References

Online

- The Australian Consortium for Heritage Collections and their Environment publishes guidelines at amol.org.au/craft/publications/hcc/environment_guide/environ_1.pdf (hosted by Australian Museum Online – AMOL)
- AMOL also publishes a FAQ for conservation of artworks; although focused on Australian concernts, it includes much of value, at http://www.amonline.net.au/materials_conservation/faq/
- The University of Melbourne publish a useful guide to conservation, including the handling of fragile materials, at http://home.vicnet.net.au/~conserv/prepast1.htm

Nominated by Minerva Partners

- **Germany** : Workflow and tools for providing access to larger quantities of archival material : http://www.lad-bw.de
- **Italy :** DADDI **:** http://www.uffizi.firenze.it/Dta/daddi-eng.html

Handling of Originals

Introduction

This section considers how a digitisation project should treat the material which is being digitized. In many cases, the source material is rare or valuable; the negative effects of digitisation on the source material must be minimized.

In every case, it must be emphasized that the specialist knowledge of the individuals who are responsible for the source material on a day to day basis will be valuable to the project team.

Guideline Title

Choice of digitisation hardware

Issue Definition
The most appropriate hardware must be chosen for each article to digitised.

Guideline Text

- Expert advice (e.g. from the curator of the item to be digitised) should be sought before any handling of the original, including the selection of a hardware solution.

- This advice should be sought prior to digitisation, ideally at the time that the article is selected for digitisation. The advice should be recorded in the digitisation management knowledge base, and consulted before movement or digitisation of the article. If necessary, the expert should be briefed on the capabilities of each possible hardware solution.

- Usually, a flatbed scanner should only be used where the material is already flat, and will not be damaged by being held against a hard, flat surface. A scanner with a book cradle may be appropriate for many bound articles, up to the appropriate size limits.

- If a scanner is used, it should ideally be at least as large as the item to be scanned.

- If an item must be scanned in multiple parts, an overlap of several centimeters should be provided, in order to ensure that there are no gaps between the parts. The same settings, light, etc should be used for all parts, in order to avoid any 'patchwork' effect.

- A digital camera with a dedicated copy stand should be used for items that cannot be scanned. The camera should be tripod-mounted, and have supplementary lighting, filters, etc, as appropriate. Consultation with an experienced digital photographer with a background in similar projects is advised, if at all possible, before setting up the hardware environment.

Notes/Commentary
It should be borne in mind that, while hardware may be replaced or upgraded, digitisation will have some impact on any source material, and so should not be repeated unless strictly necessary.

References
Online

- Harvard University publishes notes on the choice of appropriate digitisation hardware at http://preserve.harvard.edu/resources/imagingsystems.html

- The Preservation Administration Discussion Group covers a range of topics in the digitisation area. It can be found at http://palimpsest.stanford.edu/byform/mailing-lists/padg/
- Canadian Heritage provides notes on hardware at http://www.chin.gc.ca/English/Digital_Content/Capture_Collections/capturing_images.html

Nominated by Minerva Partners

- **Ireland :** ACTIVATE : http://www.activate.ie
- **Italy :** DADDI **:** http://www.uffizi.firenze.it/Dta/daddi-eng.html
- ***Italy :*** *Diplomatico* **:** http://www.archiviodistato.firenze.it/progetti/attivite.htm
- ***Italy :*** *Mediceo avanti il Principato on line***:** http://www.archiviodistato.firenze.it/Map/
- **Italy :** Rinascimento Virtuale -Digitalepalimpsest Forschung (RV) : www.iccu.sbn.it , www.bml.firenze.sbn.it
- **Sweden** : The Oxenstierna Project. : http://www.ra.se/ra/Oxenstierna/oxenstierna1.html
- **UK :** Compass : http://www.thebritishmuseum.ac.uk/compass

Guideline Title

Movement and manipulation of original material

Issue Definition

In many cases, the material to be digitised is of particular sensitivity or fragility. Replacing hands-on access with online access is often an important reason for digitisation projects in the first place. It is critical that any digitisation project take steps to ensure that no damage is done to the original material during the digitisation process. These steps may range from the use of the correct hardware to the establishment of a suitable micro-climate or the movement of the digitisation centre of operations to the location of the material, rather than vice versa.

Guideline Text

- Consult the person usually responsible for the source material, before moving or handling it. Include any information provided by him, in the digitisation project knowledge base.

- Be prepared to be flexible – an inconvenience to the digitisation project can be overcome, while damage to a unique artifact may be irretrievable.

- If necessary, bring the digitisation equipment (e.g. digital camera) to the source item, rather than transporting the item itself.

Notes/Commentary

While much of this material is quite obvious, it is important to establish and maintain a discipline while handling the source material.

References

Online

- The Australian Consortium for Heritage Collections and their Environment publishes guidelines at amol.org.au/craft/publications/hcc/environment_guide/environ_1.pdf (hosted by Australian Museum Online – AMOL)
- AMOL also publishes a FAQ for conservation of artworks; although focused on Australian concernts, it includes much of value, at http://www.amonline.net.au/materials_conservation/faq/
- The University of Melbourne publish a useful guide to conservation, including the handling of fragile materials, at http://home.vicnet.net.au/~conserv/prepast1.htm
- The Preservation Administration Discussion Group covers a range of topics in the digitisation area. It can be found at http://palimpsest.stanford.edu/byform/mailing-lists/padg/

Nominated by Minerva Partners

- **Ireland :** ACTIVATE : http://www.activate.ie
- **Italy :** DADDI **:** http://www.uffizi.firenze.it/Dta/daddi-eng.html
- ***Italy :*** *Mediceo avanti il Principato on line:* http://www.archiviodistato.firenze.it/Map/
- **Italy :** Rinascimento Virtuale - Digitalepalimpsest Forschung (RV) : www.iccu.sbn.it , www.bml.firenze.sbn.it
- **UK :** Compass : http://www.thebritishmuseum.ac.uk/compass

Guideline Title

Staff Training

Issue Definition

Unless the staff working on the project have significant experience of similar projects, there will be a requirement for staff training. This will include two quite different areas – the technology to be used, and the handling of the source material.

Guideline Text

- Do not assume that no staff training is required, nor that library or museum staff automatically have all the relevant expertise.

- Ensure that the training requirements of the staff on the project are identified at the start of the project. These training requirements should be included in the digitisation project knowledge base, and acted upon before the training is needed in the project.

- Certain training, such as the use of the digitisation technology, may be to learn 'on the job'; other training, such as handling of source materials, requires training in advance.

- A smaller core of personnel, who are trained and develop experience during the whole project, is to be preferred to a larger, more casual group which changes its membership more frequently.

- Technology training may be well delivered from another project in the same institution; alternatively an outside digitisation agency may be able to provide this.

- Curator training may best be provided by the individuals who are responsible for the care of the original material.

Notes/Commentary

A lack of staff training can lead to unfortunate and irreversible accidents or incidents early in the project; the same may result at any time if staff are moved and new personnel start to work on the project. A small, well-trained core is a desirable aspect of such projects.

Time invested in training at the start of the project should be repaid in extra productivity and less problems during the life of the project.

References

No references were identified which addressed this area.

The Digitisation Process

Introduction

This section provides some practical guidelines for the actual digitisation process. Scanning, digital photography and optical character recognition are the areas which are covered in some detail, as being most relevant to the largest number of projects.

Guideline Title

Scanning

Issue Definition

Flatbed scanners are a very common digitisation tool. The most common A4 and A3 models are relatively cheap, require limited skills to use, and can manage a fast throughput of material, once a workflow has been put in place. Larger models (up to A0) are very expensive and thus require personnel familiar with their operation.

Guideline Text

- Only scan material on a flatbed scanner which will not be damaged by being pressed flat onto a hard surface. Consult the experts, if in doubt.

- Ensure that the glass scanning plate is completely clean at all times. This both leads to better image quality and also protects the source material from soiling.

- If possible, scan only items which fit, in one piece, on the flatbed scanner.

- If it is necessary to scan an item in multiple parts, ensure that there is sufficient overlap to allow the image to be reassembled.

- Test the scanner, and its output, on non-sensitive material before beginning to scan original source material. Train users with the same non-sensitive material.

- Establish a file-naming convention for the files produced by the scanner (for example by using the existing cataloguing system or giving them meaningful names. The important thing is that the filename should allow mapping between the file and the source item. In order to maximise the portability of files across computer platforms, a file name with a maximum of eight characters, followed by an extension of at most three characters, should be adhered to. This limits the ability of the filename itself to include information about the file; a record of filename and file properties should be maintained in the knowledge base.

- Before establishing workflow or work-batching process, carry out some end-to-end scanning and image processing, in order to ensure that the end result of the workflow will be what is anticipated.

- Once an item has been scanned, note the filename, type, size, date and location, as well as the source identifier, in the digitisation project knowledge base. This can subsequently be associated with a meta-data profile (see below).

- Scan at the highest resolution that is feasible given the limitations of scanner and of PC storage

- Scan with the maximum appropriate colour depth, given the same limitations.

- Back up the hard disk where the data is stored, on a daily basis.

- Quality Control of the scanner output is important – at scanning time is the most convenient time to address any issues with quality. The following points may be borne in mind:

    - Establish minimum resolution and colour parameters, for groups of items to be scanned.

    - Examine the scanned output on screen, on paper and in any other format that you expect it to be used for (e.g. on a mobile device).

    - Ensure that the screens (monitors) being used are themselves reliably calibrated. Avoid having other material on and around the screen, which may affect the perception of the item.

Notes/Commentary

Scanning is in itself a relatively simple operation. However, in order to increase efficiency and minimize errors, having a workflow system in place will be worthwhile.

Scanning of oversize items, or very high quality scanning, takes a significant investment of time and effort per item. This can be reduced by using hardware appropriate to the item (e.g. a larger scanner, a book cradle); in the event that large hardware resources are not available, allow plenty of time. Training on oversize or irregular materials should not be neglected.

References

Online

- A good guide to Workflow and process management is on the tasi site at http://www.tasi.ac.uk/advice/managing/jidi_workflow.html
- A user-friendly site on the scanning process is provided at www.scantips.com
- A short overview on how to use a scanner is provided at http://www.aarp.org/computers-howto/Articles/a2002-07-16-scan

- There are countless scanning pages on the Internet – use Google or a similar search engine to browse them.

Nominated by Minerva Partners

Most or all of the projects described in Appendix A will have used scanners at some stage. Some examples are given here

- **Germany** – Digital Conversion Forms : http://www.lad-bw.de
- **Germany** - Workflow and tools for providing access to larger quantities of archival material http://www.lad-bw.de

- **Spain** : Biblioteca Virtual Miguel de Cervantes (Miguel de Cervantes Digital Library) : http://cervantesvirtual.com/
- **Finland :** Digital historical newspaper Library 1771-1860 (ready), continuing to 1890 : http:// digi.lib.helsinki.fi . The Nordic library: http://tiden.kb.se
- **France** : INA digitisation programme of National Audio-Visual Archives.: http://www.ina.fr/index.en.html
- **Greece :** ODYSSEUS : http://www.culture.gr
- **Ireland :** ACTIVATE : http://www.activate.ie
- **Italy :** DADDI **:** http://www.uffizi.firenze.it/Dta/daddi-eng.html
- **Italy** *: Diplomatico :* http://www.archiviodistato.firenze.it/progetti/attivite.htm
- **Italy :** Edit16 **:** http://edit16.iccu.sbn.it
- **Italy :** www.pinacotecabologna.it
- **Italy** *: Mediceo avanti il Principato on line***:** http://www.archiviodistato.firenze.it/Map/
- **Italy :** Rinascimento Virtuale -Digitalepalimpsest Forschung (RV) : www.iccu.sbn.it , www.bml.firenze.sbn.it
- **Potugal** : Endovelliccus : www.ipa.min-cultura.pt
- **Portugal :** MatrizNet : http:// www.matriznet.ipmuseus.pt
- **Sweden** : The Oxenstierna Project. : http://www.ra.se/ra/Oxenstierna/oxenstierna1.html
- **UK :** Compass : http://www.thebritishmuseum.ac.uk/compass

Guideline Title

Photography

Issue Definition
The use of digital cameras is becoming increasingly common in digitisation projects. This reflects their flexibility in terms of being able to photograph non-flat objects, such as bound books, folded or wrinkled manuscripts, and 3D objects.

Guideline Text

- Utilise the best digital camera that the project can acquire.
- Consider renting a high-quality camera, if the scope of the project is limited.
- Do not photograph without a tripod.
- Ideally use a copy stand with specially tailored lights.
- Organise training from a specialist digital photographer –the difference in quality between pictures taken by an amateur and the same photos taken by a specialist can be striking.
- Ensure that backgrounds will show the item clearly.
- Avoid changing the light conditions between shots, and between photographs of different parts or sides of an item – this can lead to erroneous impressions of colour variation.
- Use appropriate filters to combat colour distortion.

Notes/Commentary
The increasing use of digital cameras in digitisation projects reflects their availability as a mainstream consumer product, and the resulting decrease in price. However, there remains a significant difference, in both price and quality, between specialist digital cameras and those available on the high street. Given that the quality of the image is the single greatest technical constraint on the output of a digitisation project, the project team should fully investigate the hardware available, before relying on an economical consumer electronics device.

References

Online

- A good guide to Workflow and process management is on the tasi site at http://www.tasi.ac.uk/advice/managing/jidi_workflow.html
- A guide on the basics of using a digital camera is provided at http://www.pcphotoreview.com/basic3040crx.aspx
- The tasi page on hardware and software may be useful – see http://www.tasi.ac.uk/advice/creating/hwandsw.html
- NCSU provide a guide to the practical use of digital camera at http://www.ncsu.edu/sciencejunction/route/usetech/digitalcamera/

Nominated by Minerva Partners

Most of the projects listed in Appendix A will have used a digital camera extensively. Of particular interest is the Italian Daddi project.

- **Germany** – Digital Conversion Forms : http://www.lad-bw.de
- **Germany** - Workflow and tools for providing access to larger quantities of archival material : http://www.lad-bw.de
- **Spain** : Biblioteca Virtual Miguel de Cervantes (Miguel de Cervantes Digital Library) : http://cervantesvirtual.com/
- **Greece :** ODYSSEUS : http://www.culture.gr
- **Ireland :** ACTIVATE : http://www.activate.ie
- **Italy :** DADDI **:** http://www.uffizi.firenze.it/Dta/daddi-eng.html
- **Italy :** *Diplomatico* **:** http://www.archiviodistato.firenze.it/progetti/attivite.htm
- **Italy :** Edit16 **:** http://edit16.iccu.sbn.it
- **Italy :** www.pinacotecabologna.it
- **Italy :** *Mediceo avanti il Principato on line***:** http://www.archiviodistato.firenze.it/Map/
- **Italy :** Rinascimento Virtuale -Digitalepalimpsest Forschung (RV) : www.iccu.sbn.it , www.bml.firenze.sbn.it
- Italy : Virtual Archaeological Tours around the Lost Cities : http://www.archeologia.beniculturali.it (especially Virtual Reality)
- **Potugal** : Endovelliccus : www.ipa.min-cultura.pt
- **Portugal :** MatrizNet : http:// www.matriznet.ipmuseus.pt
- **Sweden** : The Oxenstierna Project. : http://www.ra.se/ra/Oxenstierna/oxenstierna1.html
- **UK :** Compass : http://www.thebritishmuseum.ac.uk/compass

Guideline Title

Optical Character Recognition (OCR)

Issue Definition

Many digitisation projects involve the digitisation of printed documents, such as a books and newspapers. This occurs most often (though not exclusively) in tandem with the use of scanners. The use of OCR software is a popular way to extract the information from such scanned information, and to open opportunities for processing the information. OCR software recognises the letters and numbers which make up the scanned image, and exports them as text files, rather than as image files. This enables searching, indexing, format conversion, and other data processing operations to be carried out.

Guideline Text

- Evaluate multiple OCR software offerings before selecting a particular product. While OCR software is often included with the sale of a scanner, more powerful software is typically sold separately.

- A major element of any OCR project is the identification and manual editing of mistakes, ambiguities and locations where the text could not be processed. An OCR package which provides a friendly user interface for carrying out this task can save considerable time and effort.

- OCR works best with documents which are in good condition – folding, wrinkling and discoloration of the source material will increase the number of errors and faults in the OCR process. Pre-treatment, where possible, of the source material should be carried out to avoid this.

- The use of image processing software, to remove discoloration and improve contrast, before the use of OCR software, should be considered for material which is not in perfect condition.

- The availability (or not) of dictionaries in the language of the source material, as part of the OCR package, should be verified.

Notes/Commentary

English language products in this market include

- OmniPage
- TextBridge and
- Adobe Capture.

The last of these has excellent editing and fault resolution functionality.

References

Online

- The University of Maryland hosts a major OCR resource at **http://documents.cfar.umd.edu/**
- A brief OCR overview is provided by computerworld magazine at **http://www.computerworld.com/softwaretopics/software/apps/story/0,10801,73023,00.html**
- A worthwhile technical report on OCR is provided by the University of New York, Buffalo, at **http://www.cedar.buffalo.edu/Publications/TechReps/OCR/ocr.html**
- A report on OCR, newspapers and microfilm is provided by IFLA at **http://www.ifla.org/VII/s39/broch/microfilming.htm**

Nominated by Minerva Partners

- **Austria** : Digital Image Archive www.bildarchiv.at (automated. indexing)
- **Germany** – Digital Conversion Forms : http://www.lad-bw.de
- **Spain** : Biblioteca Virtual Miguel de Cervantes (Miguel de Cervantes Digital Library) : http://cervantesvirtual.com/
- **Finland :** Digital historical newspaper Library 1771-1860 (ready), continuing to 1890 : http:// digi.lib.helsinki.fi . The Nordic library: http://tiden.kb.se
- **Sweden** : The Oxenstierna Project. : http://www.ra.se/ra/Oxenstierna/oxenstierna1.html

Preservation of Digital Master Material

Introduction

In the longer term, it is an important goal of any digitisation project to protect the data which it has created. This involves dealing with the inevitable obsolescence of digital file formats and various types of computer storage media.

Preserving the digital master material helps to avoid having to re-digitise any items, thus protecting the fragile source material and avoiding repetition of the labour-intensive digitisation process.

Guideline Title

File Formats

Issue Definition

The output of the digitisation process is a computer file. The format of the file which is created can usually be configured prior to the digitisation process. The file format will have a major impact on the usability of the digitisation output. Issues such as file format standards, file size, network transmission time and image display need to be taken into account at this stage.

Guideline Text

- Before deciding on a file format, take into account the relevant standards, the established global user base and the degree to which file formats are supported by software in use by your organisation and your target audience. The size of the global user base is a good indicator of the future, ongoing, support for a particular file format. It also indicates the likelihood of sustainable migration paths, when file formats change.

- The default digitisation output file for images and scanned text is Tagged Image File Format (TIFF). Unless your project has a clear, justified reason for using some other file format, digitisation output, and so master files, should use this format. TIFF is widely supported and uses no compression, so that all of the data captured during the digitisation process is stored.

- The output file will typically be quite large. It is common to have a large master file, which is stored locally but not transmitted over the Internet. From this, smaller versions can be created using image processing software, either in TIFF, or more commonly in a delivery format such as JPEG, PNG or GIF (see the section on image standards, later in this document).

- The default digitisation output file format for audio in the Internet environment is MP3. However, more important at this stage of the project is the resolution of the audio file – the frequency with which the sound is sampled and the amount of storage dedicated to each sample. 16-bit 44KHz CD-standard sampling is recommended for master copies.

- Unless your project has a good reason not to do so, MP3 should be considered as a reasonable choice of audio file format. WAV is also an option, for Windows platforms. While lossless, the file size is significant.

- The default digitisation output for video in the Internet environment is MPEG. This has a large user base and wide support across creation, editing and viewing applications. Unless your project has a good reason not to do so, MPEG should be considered as a reasonable choice of video file format.

- More information on file formats is provided in the survey of standards provided later in this document.

- Regardless of how attractive a proprietary or national format may appear to be from a technical standpoint, it is important to bear in mind that failure to use standard formats and media will act as a major obstacle to international interoperability and the creation of networked resources.

Notes/Commentary

File format choice must be governed by the imperative to create the highest quality digitisation output, and by the availability of migration paths for future preservation of the digital master. The role of standards in this area is very great.

References

Online

- The AHDS provides a directory of material on the preservation of digital content at http://www.pads.ahds.ac.uk:81/padsProjectLinksDirectory/PreservationDigitalMaterial
- The Australian PADI initiative hosts a huge range of information on digital preservation, at http://www.nla.gov.au/padi/, particularly at http://www.nla.gov.au/padi/topics/44.html
- Reference Model for an Open Archival Information System. http://ssdoo.gsfc.nasa.gov/nost/isoas/overview.html
- Gregory W. Lawrence, William R. Kehoe, Oya Y. Rieger, William H. Walters, and Anne R. Kenney, Risk Management of Digital Information: A File Format Investigation (CLIR 2000). http://www.clir.org/pubs/abstract/pub93abst.html

Nominated by Minerva Partners

- **Germany** – Digital Conversion Forms : http://www.lad-bw.de
- **Spain** : Biblioteca Virtual Miguel de Cervantes (Miguel de Cervantes Digital Library) : http://cervantesvirtual.com/
- **Finland :** Digital historical newspaper Library 1771-1860 (ready), continuing to 1890 : http:// digi.lib.helsinki.fi . The Nordic library: http://tiden.kb.se
- **Italy :** DADDI **:** http://www.uffizi.firenze.it/Dta/daddi-eng.html
- **Sweden** : The Oxenstierna Project. : http://www.ra.se/ra/Oxenstierna/oxenstierna1.html
- **UK** : NOF-digi technical standards http://www.peoplesnetwork.gov.uk/nof/technicalstandards.html

Guideline Title

Media Choices

Issue Definition

The issue of media choice is an important one for projects which wish to maintain their digital collections over a several-year period. Important projects such as the UK Domesday book initiative have been lost due to media obsolescence.

Guideline Text

- The output of the digitisation project will be held on server machines, including those which serve digital content to Internet users. However, these machines need to be backed up. Also, if a server is not dedicated to a digitisation project, the digital content should also be stored on removable media, separate to other data on the server.

- Currently (early 2003), the use of CD-ROMs as a common backup medium is in the process of being replaced by the use of DVDs. DVDs offer significantly larger storage, and the hardware needed to read them is becoming ubiquitous on new PCs and laptops. DVD writers remain more expensive, but are already well within the means of all but the smallest projects.

- However, DVDs are not expected to replace Digital Linear Tape (DLT) as the storage medium of choice for backup of computer storage, in the near future. Both of these technologies should be seriously considered as candidates for preservation of digital content.

- Regardless of the choice of medium, it must be borne in mind that the medium will become obsolete in near to mid-term future. Within five years, migration to new storage media is likely to be a necessity.

Notes/Commentary

The rapid change of media layouts, driven often by the consumer electronics industry, has had major effects on digitisation projects in the past.

However, the increasing trend to store data 'on the Internet' on large server machines, and as data on mobile hard drive units, facilitates the migration of data from place to place and from medium to medium. Once servers are backed up and migrated to new servers over time, the dependence on removable media as the only record of a digitisation process can be expected to decrease.

In the meantime, the issue of media selection is still an important one. There is no indication that the limits of compressed, small-footprint digital storage are being reached.

References

Online

- The AHDS provides a directory of material on the preservation of digital content at http://www.pads.ahds.ac.uk:81/padsProjectLinksDirectory/PreservationDigitalMaterial
- The Australian PADI initiative hosts a huge range of information on digital preservation, at http://www.nla.gov.au/padi/, particularly at http://www.nla.gov.au/padi/topics/44.html
- Reference Model for an Open Archival Information System. http://ssdoo.gsfc.nasa.gov/nost/isoas/overview.html
- Gregory W. Lawrence, William R. Kehoe, Oya Y. Rieger, William H. Walters, and Anne R. Kenney, Risk Management of Digital Information: A File Format Investigation (CLIR 2000). http://www.clir.org/pubs/abstract/pub93abst.html

Nominated by Minerva Partners

- **Germany** – Digital Conversion Forms : http://www.lad-bw.de
- **Spain** : Biblioteca Virtual Miguel de Cervantes (Miguel de Cervantes Digital Library) : http://cervantesvirtual.com/
- **Finland :** Digital historical newspaper Library 1771-1860 (ready), continuing to 1890 : http:// digi.lib.helsinki.fi . The Nordic library: http://tiden.kb.se
- **France** : INA digitisation programme of National Audio-Visual Archives.: http://www.ina.fr/index.en.html

Guideline Title

Migration Strategies

Issue Definition

As noted above, the choice of file format and storage medium must take into account the feasibility of moving data to a new file format and/or a different storage medium, in the foreseeable future.

Guideline Text

- Examine the relevant standards for file formats and storage medium, as noted in the previous two guidelines. Compliance with standards is a reasonable indicator that a particular format or medium will have some support into the future.

- Proprietary file formats and non-standard media formatting should be adopted only with great care.

- Migration from one format to another should avoid migrating from a lossless file format (e.g. TIFF in the image domain) to a lossy one (e.g. JPEG), for master digital material. Once information is lost, it cannot be replaced.

- Bear in mind that any choice of file format and/or storage medium will become obsolete in the foreseeable future (possibly less than five years, probably less than ten years).

- The size of the market for storage media provides an indication of how likely it is that migration from one medium to a new one will be feasible, as the medium becomes obsolete.

- Having created the digitised material, storage media (e.g. CD-R, DVD) should be refreshed periodically (once every two to three years), to combat data loss. This involves copying all media to new media.

- The status of digitised material, including when it was last refreshed, should be recorded in an appropriate log.

- Copies of digitised material should be stored in multiple locations whenever feasible, to reduce the risk of catastrophic data loss in the event of fire, etc.

Notes/Commentary

None

References
Online

- The AHDS provides a directory of material on the preservation of digital content at http://www.pads.ahds.ac.uk:81/padsProjectLinksDirectory/PreservationDigitalMaterial
- The Australian PADI initiative hosts a huge range of information on digital preservation, at http://www.nla.gov.au/padi/, particularly at http://www.nla.gov.au/padi/topics/44.html

Nominated by Minerva Partners

- **Germany** – Digital Conversion Forms : http://www.lad-bw.de
- **Spain** : Biblioteca Virtual Miguel de Cervantes (Miguel de Cervantes Digital Library) : http://cervantesvirtual.com/
- **Finland :** Digital historical newspaper Library 1771-1860 (ready), continuing to 1890 : http:// digi.lib.helsinki.fi . The Nordic library: http://tiden.kb.se
- **France** : INA digitisation programme of National Audio-Visual Archives.: http://www.ina.fr/index.en.html
- **Italy :** "I dipinti della Galleria Spada": no web site
- **UK :** Digital Preservation Workbook : http://www.jisc.ac.uk/dner/preservation/workbook/

Meta-Data

Introduction

The area of meta-data is one of the most actively researched and dynamic in the whole digitisation area, as well as in areas such as information retrieval, web searching, data exchange, enterprise application integration, etc.

Of particular importance is the meta-data model which is selected – the choice of which attributes are used to characterize an item. Related to this is the area of existing standard models, of which there are many to choose from.

Guideline Title

The scope of the meta-data used (what is being described).

Issue Definition

Before selecting a meta-data model for a digitisation project, the material to be described with the meta-data should be reviewed. This will help to identify existing meta-data models, as well as to pinpoint any omissions or gaps between what is covered by a meta-data model and the important meta-data for your project.

Guideline Text

- The use of appropriate meta-data is very important for enabling search and retrieval of material from digital collections. This is even more the case when searching across multiple collections is to be attempted (logical union catalogues, virtual combined museums, etc.).

- There are very many meta-data models already in existence - it is advisable to avoid creating a new one, unless the requirements of your project are badly underserved by all existing standards.

- Time spent modeling the important characteristics of the material being digitised, and identifying its key attributes and descriptors will be well invested. Such a model can then be compared with the scope and features of existing meta-data models.

- Possible controlled vocabularies (e.g. to describe a location, or an artist) should be identified. Several such vocabularies already exist and can greatly increase the success of searches, etc. See the section on meta-data standards and controlled vocabularies, below, for details.

Notes/Commentary

Comments: The Making of America II project (Library of Congress) used three categories of meta data

- Descriptive – for description and identification of information
- Structural – for navigation and presentation
- Administrative – for management and processing

Each of these areas could be considered when planning a meta-data model. In addition, there are the technical meta-data which, if stored, will assist in the migration of, and replication of, digitised data. The National Library of Australia has a powerful model for this.

The plethora of existing models and competing standards for meta-data has led to projects which focus purely on translating from one standard to another.

References

Online

- **The tasi page on meta-data is at** www.tasi.ac.uk/advice/delivering/metadata.html
- The Colorado guidelines for meta-data creation and entry are at http://coloradodigital.coalliance.org/glines.html
- PADI's meta-data page is at http://www.nla.gov.au/padi/topics/30.html
- An unusual approach to user-generated meta-data is used at www.gimp-savvy.com
- The Dublin Core is covered at www.dublincore.org
- The Encoded Archival Description (EAD) home page is at www.loc.gov/ead/

Nominated by Minerva Partners

- **Finland :** Digital historical newspaper Library 1771-1860 (ready), continuing to 1890 : http:// digi.lib.helsinki.fi . The Nordic library: http://tiden.kb.se
- **France :**National digitisation programme - annual project calls : http://www.culture.gouv.fr/culture/mrt/numerisation/index.htm
- **Germany** – BAM Portal http://www.bam-portal.de/
- **Greece :** ODYSSEUS : http://www.culture.gr
- **Italy :** DADDI **:** http://www.uffizi.firenze.it/Dta/daddi-eng.html
- ICONCLASS in Italian : www.iccd.beniculturali.it
- **Italy** : Information Network dei Beni Culturali : www.iccd.beniculturali.it
- **Italy :** Rinascimento Virtuale-Digitalepalimpsest Forschung (RV) : www.iccu.sbn.it , www.bml.firenze.sbn.it
- **Italy:** SBNonline **:** http://sbnonline.sbn.it
- **Sweden** : The Oxenstierna Project. : http://www.ra.se/ra/Oxenstierna/oxenstierna1.html
- **UK :** Compass : http://www.thebritishmuseum.ac.uk/compass

Guideline Title

Appropriate meta-data standards

Issue Definition
Certain important standards already exist for meta-data. In the bibliographic domain (and increasingly in non-library cultural domains), the Dublin Core standard is of great importance.

Guideline Text

- Review existing meta-data models and standards before creating your own.
- Creating a totally new meta-data model for cultural collections should be avoided.
- The meta-data work carried out by similar projects in the past is likely to be relevant to your project – meta-data models travel well between projects in the cultural area.
- Unless your project has good reason not to do so, the Dublin Core fields should be included in the meta-data model. While museums may find the CIMI model better fits their holdings, a common core set of attributes should be aimed for, which will enable cross-collection searching.
- If a proprietary meta-data model is to be used, a mapping from this model to the Dublin Core should also be developed.
- While a naming scheme or national naming convention may be very useful, a full meta-data model is better, both in terms of the amount of data that can be stored about an item, and also to enable more powerful searching and interoperation with other projects and other countries.

Notes/Commentary

There are an impressive number of existing standards, covering various aspects of meta-data. However, there is also significant overlap across standards, and a very large population of institution-specific models, where sectoral or cross-domain models have been neglected.

References
Online

- **The tasi page on meta-data is at** www.tasi.ac.uk/advice/delivering/metadata.html
- The Colorado guidelines for meta-data creation and entry are at http://coloradodigital.coalliance.org/glines.html
- PADI's meta-data page is at http://www.nla.gov.au/padi/topics/30.html
- An unusual approach to user-generated meta-data is used at www.gimp-savvy.com

- The Dublin Core is covered at www.dublincore.org
- The Encoded Archival Description (EAD) home page is at www.loc.gov/ead/

Nominated by Minerva Partners

- **Finland :** Digital historical newspaper Library 1771-1860 (ready), continuing to 1890 : http:// digi.lib.helsinki.fi . The Nordic library: http://tiden.kb.se
- **France :**National digitisation programme - annual project calls : http://www.culture.gouv.fr/culture/mrt/numerisation/index.htm
- **Greece :** ODYSSEUS : http://www.culture.gr
- **Italy :** DADDI **:** http://www.uffizi.firenze.it/Dta/daddi-eng.html
- ICONCLASS in Italian : www.iccd.beniculturali.it
- **Italy** : Information Network dei Beni Culturali : www.iccd.beniculturali.it
- **Italy:** SBNonline **:** http://sbnonline.sbn.it
- **Sweden** : The Oxenstierna Project. : http://www.ra.se/ra/Oxenstierna/oxenstierna1.html

Preparation for publication

Introduction

At this stage of the project, the digital master material has been created and stored/backed up. A suitable meta-data model has been identified, and the meta-data associated with each article has been created.

Preparation for publication involves processing the newly-created material prior to publication. Typically, publication means display on the Internet, and processing means reduction in image/audio/video file size, quality and download time, to fit the operational characteristics of the Internet.

Guideline Title

Image Processing (file format, colour depth, resolution)

Issue Definition

The TIFF files created during the digitisation process are typically very large (a few to many megabytes). Such files are not appropriate for Internet publication, due to the great length of time that they would require to download to the end user.

Guideline Text

- Create delivery versions of master material. As a minimum, there must be one delivery version. A second version, a 'thumbnail', may also be useful, depending on the layout of the web site on which the material is to be published.

- Delivery versions are created by opening the master TIFF file in an image processing package, and exporting it in JPEG, GIF or PNG file format(see 'Image Standards', below).

- Typically, colour resolution can be reduced, to 256 colours. If this shows an appreciable loss of quality, a higher colour resolution can be used. Choosing the right colour resolution usually requires some subjective decision to be made.

- An image created at 72 DPI will show at approximately its original size on many computer monitors. This makes 72DPI a reasonable choice for many images which are to be viewed on-screen. For lower resolutions, a subjective decision of 'acceptable quality' will be required.

- Choosing file format, colour resolution and pixel resolution involved deciding on what is 'acceptable' quality. A balance must be struck between quality and file size.

- In general, the total image files on a web page should not greatly exceed 100 kilobytes. Larger images can certainly be published; however, these should be

accessed via a link from the web page, with suitable warning text that the download may be prolonged.

- Unless material is being streamed, video and audio material will typically involve large file sizes, with the file downloaded before viewing offline. However, the download time can be adjusted by changing the frames per second of the video, the sampling rate of the audio, etc.

Notes/Commentary

Decisions regarding image processing depend to a large degree on personal judgement. The guidelines provided here may be considered too strict or too lax, depending on the project and the end user audience.

Image processing software such as Paint and Paintshop is freely available online. More powerful image processing software may save sufficient time and effort to justify the expense of the software.

Audio and video editing software is also available freely online. Equally, audio and video hardware is usually supplied with the software required to edit and process the data created.

References

Online

The open source GNU Image Manipulation Program is at www.gimp.org
Image optimization is addressed at http://www.yourhtmlsource.com/optimisation/imageoptimisation.html
The University of Oregon provides a very brief look at image optimization at http://libweb.uoregon.edu/it/webpub/images.html as well as a more detailed section at http://www.uoregon.edu/~jqj/inter-pub/images/

The University of Minnesota provides practical material on image manipulation at http://www.geom.umn.edu/events/courses/1996/cmwh/Stills/manipulating.html
Montana State University provides guidelines for images in web pages at www.msubillings.edu/tool/ Guidelines%20for%20using%20images%20on%20web%20pages.pdf

Nominated by Minerva Partners

Spain : Biblioteca Virtual Miguel de Cervantes (Miguel de Cervantes Digital Library) : http://cervantesvirtual.com/
Greece : ODYSSEUS : http://www.culture.gr
Italy : DADDI **:** http://www.uffizi.firenze.it/Dta/daddi-eng.html
Italy : Rinascimento Virtuale -Digitalepalimpsest Forschung (RV) : www.iccu.sbn.it , www.bml.firenze.sbn.it
Sweden : The Oxenstierna Project. : http://www.ra.se/ra/Oxenstierna/oxenstierna1.html
UK : Compass : http://www.thebritishmuseum.ac.uk/compass

Guideline Title

3D and Virtual Reality Issues

Issue Definition

The guidelines provided above for image publication are not immediately applicable to digital renderings of 3D and virtual reality material. However the balance between quality and file size is a common one on the Internet.

Guideline Text

- Viewers for 3D and VR material are not yet widely distributed with operating system software. This contrasts with image, audio and video, which are commonly provided with Windows software.

- Ensure that viewers for any 3D or VR material are readily available. Make the viewer software available from the same site as the material. This helps to overcome any issues with other software download sources becoming unavailable.

- Evaluate multiple viewers before endorsing one or another. Compatibility across file formats and viewers is not so standardized as in the still image domain.

- Modern PCs, with a focus on games, will often have hardware accelerators and increased graphics memory. This can have a profound effect on the VR viewing experience.

Notes/Commentary

A VRML viewer which has been successfully used in one of the reference projects (the Irish ACTIVATE project) is the Blaxxun Contact viewer).

References

Online

- The VRML standard is covered in some detail at www.web3d.org
- Shockwave 3D is covered at www.macromedia.com and at http://www.3dlinks.com/community_shockwave3D.cfm
- Washington University has a very large, but slightly out-of-date knowledge base on virtual reality at http://kb.hitl.washington.edu/onthenet.html
- The US NIST also hosts a page on virtual reality resources at http://www.itl.nist.gov/iaui/ovrt/hotvr.html
- The AHDS has a guide to VR for cultural bodies at http://vads.ahds.ac.uk/guides/vr_guide/index.html

Nominated by Minerva Partners

- **Spain** : Biblioteca Virtual Miguel de Cervantes (Miguel de Cervantes Digital Library) : http://cervantesvirtual.com/

- **Ireland : ACTIVATE : http://www.activate.ie**
- **Italy : DADDI :** http://www.uffizi.firenze.it/Dta/daddi-eng.html

Online Publication

Introduction

The actual process of making material available on the web is one which is widely understood and documented. This handbook does not provide guidance on how the create websites, program in HTML, build web-enabled databases and carry out the other tasks which are needed to create and maintain a web presence. It is anticipated that many of the cultural institutions which utilise these guidelines will already have some web server functionality availability, which they will exploit for their digitisation project.

A small sample of the very large amount of assistance and information available online in the general area of web site design and creation is identified here. However, this is not intended to be a substitute for having web development and design resources available to the digitisation project from the start.

Guideline Title

Web Site Creation

Issue Definition

Many digitisation projects in the cultural area lead to the creation of online cultural resources, usually a web site with images, meta-data, 3D artifacts, etc. They range from the simplest content sites to complex, software-driven portals and viewing engines. A large body of knowledge covers the creation of web sites; only a few guidelines are provided here, as well as links to examples of web sites nominated as best practice examples by Minerva partners.

Guideline Text

- Web sites should be easy to navigate – links to the front page or to a table of content should be available throughout.
- Due attention should be paid to universal access and to the utilisation of web sites by the partially sighted and other disabled persons.
- Web pages should be short enough to minimize the amount of scrolling necessary by the user.
- Images should be small enough not to disrupt the browsing experience. Larger images should be linked to from the web pages, with a note to the effect that the image is large and download may be slow.
- The use of animations, pop-ups, pop-unders, Flash and similar technologies should be treated with care. It should be possible to bypass lengthy introductory animation sequences.
- Web sites should ideally be multilingual, with at least the host country language and one or two other languages (commonly including English, as the de facto online language standard) supported.
- Links to external resources should be verified on a periodic basis, in order to minimize dead links and the annoyance associated with these.

Notes/Commentary

There are many more recommendations for the creation of web sites – the above are simply samples. In the references below, some examples of different types of website are noted :

Simple information website : ACTIVATE (www.activate.ie), **:** "le piazze storiche"**:** http://cantieri.theranet.it/piazze

Large multi-element websites : Biblioteca Virtual Miguel de Cervantes: http://cervantesvirtual.com/

High-tech websites with significant proprietary software : DADDI : http://www.uffizi.firenze.it/Dta/daddi-eng.html

Interactive websites with tours, etc : Compass : http://www.thebritishmuseum.ac.uk/compass

References

Online

The creation of web sites is one of the most documented topics on the web. Examples include the following, but a search with any search engine will show literally thousands more

- Web page design : **http://www.essdack.org/webdesign/**
- Web page authoring : http://www.htmlgoodies.com
- IASL web page awards – a source of ideas : **http://www.iasl-slo.org/web_award.html**
- The Louvre web page : **http://www.paris.org/Musees/Louvre/**
- Sun Microsystems list of library web pages, Europe section : **http://sunsite.berkeley.edu/Libweb/Europe_main.html**

Nominated by Minerva Partners

Almost every project listed in Appendix A has a website. Some examples of websites which are interesting due to their size, or their simplicity, include the following

Spain : Biblioteca Virtual Miguel de Cervantes (Miguel de Cervantes Digital Library) : http://cervantesvirtual.com/
France : INA digitisation programme of National Audio-Visual Archives.: http://www
Greece : ODYSSEUS : http://www.culture.gr
Ireland : ACTIVATE : http://www.activate.ie
Italy : DADDI : http://www.uffizi.firenze.it/Dta/daddi-eng.html
Italy : Edit16 **:** http://edit16.iccu.sbn.it
Italy : www.pinacotecabologna.it
Italy : "le piazze storiche"**:** http://cantieri.theranet.it/piazze
Italy : Rinascimento Virtuale-Digitalepalimpsest Forschung (RV) : www.iccu.sbn.it , www.bml.firenze.sbn.it
Portugal : MatrizNet : http:// www.matriznet.ipmuseus.pt (high quality web site).
Sweden: The Oxenstierna Project. : http://www.ra.se/ra/Oxenstierna/oxenstierna1.html

UK : Compass : http://www.thebritishmuseum.ac.uk/compass

IPR and Copyright

Introduction

The publication of any material online must be accompanied by some consideration of the intellectual property rights (IPR) associated with the material. For material which is in the public domain (such as particularly old books or newspapers, or material placed explicitly in the public domain), there is relatively little difficulty. However, many cultural institutions derive revenue from the use of images of artifacts or images in their collections, and so are defensive of copyright. Material, the copyright of which is held by third parties, can only be published with the consent of such third parties.

Fortunately, a range of technical options are available to protect the copyright of material placed on the Internet. These are surveyed here.

Guideline Title

Establishing Copyright

Issue Definition

The initial step when exploring the copyright situation for a cultural item is to establish the ownership of that copyright.

Guideline Text

- Establish the legal situation with regard to copyright and publication in the country where the project is being carried out. Each country has its own copyright laws, usually dating back to at least the 19th century. Such laws usually apply to all forms of publication, including online publication. They may, or may not, cover the act of digitisation, which may be construed to be an archiving process, or may be considered copying.

- On no account should online publication go ahead without copyright being sought.

- Certain items, e.g. old newspapers, have clear copyright rules governing them. Typically these allow free copying once the papers are of a certain age. Items which fit into this category can be freely digitised and published.

- For items whose copyright is vested in the institution carrying out the project, internal permission will be required for digitisation and online publication.

- For items whose copyright is held by a third party, such as the lender or donor of a collection of historical items, that party's permission must be sought, in writing. Only when such permission has been received, should publication go ahead.

- Securing permission to digitise and publish may involve payment. The amount of payment must be balanced against the value of including the relevant item(s) in the online resource.

Notes/Commentary

The copyright situation varies from country to country.

References

Online

- tasi copyright page : http://www.tasi.ac.uk/advice/managing/copyright.html

- PADI copyright page : http://www.nla.gov.au/padi/topics/28.html
- IFLA copyright page : http://www.ifla.org/II/cpyright.htm
- University of New York, Buffalo, includes many links to copyright pages at http://ublib.buffalo.edu/libraries/units/cts/preservation/digires.html
- UK : Cedar's guide to IPR : http://www.leeds.ac.uk/cedars/guideto/ipr/
- UK : MCG Copyright in Museums and Galleries : http://www.mda.org.uk/mcopyg/index.htm
- UK : Library Association Copyright Paper :http://www.la-hq.org.uk/directory/prof_issues/pospaper.html

Nominated by Minerva Partners

- **Italy** ***:*** *Mediceo avanti il Principato on line:* http://www.archiviodistato.firenze.it/Map/
- **Italy:** SBNonline **:** http://sbnonline.sbn.it
- **Italy** : TRADEX : http://www.tradex-ist.com

Guideline Title

Safeguarding Copyright

Issue Definition

The publication of items online on the web is an open invitation to make copies of the items. It is infeasible to prevent some level of copying of material displayed on the web. However, there are a number of possible procedures which can be considered, each of which has some effect in the safeguarding of copyright.

Guideline Text

- Establish whether or not copyright must be safeguarded.
- Agree the procedures to be used to safeguard copyright, with the copyright holders.
- The following procedures are among those which could be considered
    - Addition of a visible watermark or copyright stamp on each image.
    - Addition of an invisible digital watermark on each image. Such marks can be used to prove the ownership of a 'stolen' image, as well as to track the use of the image across the Internet.
    - Encryption of images, with the issuing of the appropriate key only to registered users. This, of course, reduced the value of the online image to the rest of the public.
    - Restricting publication to low-resolution images, such as 72 DPI for screen viewing. This restricts the degree to which images can be used in other domains, such as printing, clothing, etc.
    - Restrict publication to only small parts of an image. The Italian DADDI project (see references) is an excellent example.
- Display images only to registered, authorized members of a particular community.
- Test the results of the copyright protection process using the first few items, in order to ensure that the process does not have any unexpected or unwanted effects.

Notes/Commentary

The approach which is most appropriate for any one project will depend to a large degree on the goals of the project and the cultural institution, as well as on the nature of the material. In general, the publication of a small selection of images, at low resolution, is a common approach for online galleries and museums. The relative uniqueness of many cultural holdings provides proof of ownership of copyright in many situations.

References

Online

- tasi copyright page : http://www.tasi.ac.uk/advice/managing/copyright.html
- PADI copyright page : http://www.nla.gov.au/padi/topics/28.html
- IFLA copyright page : http://www.ifla.org/II/cpyright.htm
- University of New York, Buffalo, includes many links to copyright pages at http://ublib.buffalo.edu/libraries/units/cts/preservation/digires.html
- Digimarc digital watermarks – www.digimarc.com
- Signumtech digital watermarks – www.signumtech.com
- Audio digital watermarks – www.musicode.com
- Watermarking overview - http://www.webreference.com/content/watermarks/
- General UK copyright information - http://www.copyrightservice.co.uk/copyright/protecting(02).htm
- AHDS has a copyright FAQ at http://ahds.ac.uk/copyrightfaq.htm

Nominated by Minerva Partners

The following are nominated projects with a particular interest in, or focus on, copyright.

- **Italy :** Mediceo avanti il Principato on line**:** http://www.archiviodistato.firenze.it/Map/
- **Italy** : TRADEX : http://www.tradex-ist.com
- **Italy :** DADDI : http://www.uffizi.firenze.it/Dta/daddi-eng.html **(hi-tech, interesting approach).**

Project Management

Introduction

The success of any project, including digitisation projects, is influenced to a large degree by the management of the project. This section provides a small number of guidelines specific to the management of digitisation projects in particular.

Guideline Title

Digitisation process management

Issue Definition

A typical digitisation project will involve dozens, hundreds or even thousands of items. In order to achieve an efficient project, it is important that a work-flow be established that maximises the through-put of the digitisation team. In addition, information resources such as the digitisation project knowledge base will be of significant importance.

Guideline Text

- Establish and document each of the steps that an item must go through during the digitisation process. These will include, for example,
  - retrieval from storage / usual location
  - cleaning or preparation
  - scanning or photography
  - return to usual location
  - file naming
  - file storage
  - creation of online delivery versions of large master files
  - backup of servers / storage media

- The name, identifier and other relevant information for each item to be digitised should be entered, as suggested above, in the digitisation project knowledge base, as soon as the item has been selected. The status of the item (i.e. which step it is has last completed) must also be recorded, on an ongoing basis.

- Procedural choices must be made – for example, should items be collected at the digitisation workstation at the start of each day, each week, or on a per-item basis.

- Articles which require similar activities or hardware setups should be digitised together. This reduces time spent setting up digital cameras, configuring scanners, etc. The parameters for hardware setup should be documented, in order to allow any digitisation to be replicated in the event of file loss, etc.

- The location, phone numbers and backup staff of key service delivery personnel (e.g. IT support) should be noted at the start of the project, and remain available throughout.

Notes/Commentary

The larger the project, the more worthwhile it is to establish a process and workflow. The efficiencies which this introduces will greatly repay the time spent setting them up. The

references below include some projects which concentrate purely on this aspect of digitisation.

References

Online

- A guide to digitisation project management and workflow is provided at http://www.tasi.ac.uk/advice/managing/jidi_workflow.html
- A comprehensive manual for many aspects of the digitisation project process is provided by the **NOF-Digitise** Technical Advisory Service Manual : http://www.ukoln.ac.uk/nof/support/manual/
-
- The Colorodo Digitisation Program has a section on project management at http://www.cdpheritage.org/resource/project%20management/rsrc_project_management.html
- So does Canadian Heritage at http://www.chin.gc.ca/English/Digital_Content/index.html
- AHDS has a section on managing digitisation projects at http://www.ahds.ac.uk
- Chapman, Stephen and William Comstock. "Digital Imaging Production Services at the Harvard College Library." (http://www.rlg.org/preserv/diginews/diginews4-6.html#feature1). RLG DigiNews (Dec. 5, 2000). A look inside the planning and workflow design of a project at the Harvard College Library in 1999.
- Fleischhauer, Carl. *Steps in the Digitization Process.* National Digital Library Program, Library of Congress (1996). (http://lcweb2.loc.gov/ammem/award/docs/stepsdig.html).
- Hughes, Carol Ann. "Lessons Learned: Digitization of the Special Collections at the University of Iowa Libraries." *D-Lib Magazine* (June 2000). (http://www.dlib.org/dlib/june00/hughes/06hughes.html).
- The UK HEDS Matrix provides some input on budgeting for digitisation projects at http://heds.herts.ac.uk/resources/matrix2.html

Nominated by Minerva Partners

The following are examples of nominated projects which may be in a position to provide guidance on the practical management of digitisation projects.

- **Austria** : Meta-e engine for workflow management http://meta-e.uibk.ac.at/
- **Germany** : Workflow and tools for providing access to larger quantities of archival material http://www.lad-bw.de
- **Denmark :** "The soldier in the Backyard – an interactive children's story on the Internet" **:** http://www.soldatenibaghaven.dk
- **Spain** : Biblioteca Virtual Miguel de Cervantes (Miguel de Cervantes Digital Library) : http://cervantesvirtual.com/
- **Finland :** Digital historical newspaper Library 1771-1860 (ready), continuing to 1890 : http:// digi.lib.helsinki.fi . The Nordic library: http://tiden.kb.se
- **France** : INA digitisation programme of National Audio-Visual Archives.: http://www.ina.fr/index.en.html

- **France :**National digitisation programme - annual project calls : http://www.culture.gouv.fr/culture/mrt/numerisation/index.htm
- **Greece :** ODYSSEUS : http://www.culture.gr
- **Sweden** : The Oxenstierna Project. : http://www.ra.se/ra/Oxenstierna/oxenstierna1.html
- **UK :** Compass : http://www.thebritishmuseum.ac.uk/compass
- **UK :** NOF-Digitise Technical Advisory Service Manual : http://www.ukoln.ac.uk/nof/support/manual/

Guideline Title

Training and Team Development

Issue Definition

Digitisation projects often expose the staff of cultural institutions to new technologies for the first time. Such technologies include digitisation hardware, web publication, image processing, meta-data tagging, database development and population, etc.

Guideline Text

- If possible, include at least one person with appropriate information technology skills in the project team.

- Assess the state of knowledge of the personnel to work on the project, and the IT skills that they will need, well in advance of the project. Identify training needs and fill these **before** the project starts.

- IT skills are not the only ones which may be needed. Specialist skills may be needed, as noted above, in the handling of delicate documents, artifacts, etc. Appropriate training maybe available from the individuals whose responsibility includes the source material.

Notes/Commentary

It is better to have a small core of skilled personnel working on a project than a larger population of occasional participants. However, while developing and using a particular skill is efficient for the project, staff may prefer to be exposed to the full digitisation life-cycle. Digitisation and meta-data tagging is not in itself particularly rewarding work – exposure to other elements of the project will increase staff satisfaction.

References

Denmark : "The soldier in the Backyard – an interactive children's story on the Internet" **:** http://www.soldatenibaghaven.dk (especially handling large collaborative projects)
France : National digitisation programme - annual project calls : http://www.culture.gouv.fr/culture/mrt/numerisation/index.htm
Ireland : ACTIVATE : http://www.activate.ie

Guideline Title

Working with Third Parties (technical assistance)

Issue Definition

It is often appropriate for a digitisation project to engage the services of one or more third parties during the project. The services which are most commonly provided include the actual digitisation itself, the management of the project, integration with third party systems, software development, etc. This allows the cultural body to concentrate on its own areas of expertise, without need to train and retain staff with advanced IT or other skills.

Guideline Text

- As with any other project, the relationship between technical partners and other project members should be governed by clear, strict contracts. A documented and signed specification of the products or services to be provided should be agreed before any work is carried out.

- The work being carried out should be reviewed on a regular basis, to ensure that what is being delivered is in fact what the project wants or needs.

- While the use of third parties can be convenient, it should be borne in mind that any expertise or experience to be gained during the execution of the outsourced work will be lost to the cultural institution at the end of the project. This also applies to temporary staff who are employed for the duration of a project. It may be better to dedicate a long term member of staff to a project, while replacing him in the short term with a contractor.

Notes/Commentary

Certain large projects, such as the French national digitisation programme, have identified a preferred supplier, the relationship with whom may stretch for several projects and several years. Having established a working relationship with a supplier, the value of changing supplier between projects may need to be questioned.

References

France : National digitisation programme - annual project calls : http://www.culture.gouv.fr/culture/mrt/numerisation/index.htm
Ireland : ACTIVATE : http://www.activate.ie
Italy : DADDI **:** http://www.uffizi.firenze.it/Dta/daddi-eng.html
Italy : TRADEX : http://www.tradex-ist.com
UK : Compass : http://www.thebritishmuseum.ac.uk/compass

Guideline Title

Working with Third Parties (cooperative projects and shared content)

Issue Definition

Many digitisation projects are either cooperative efforts which involve two or more cultural bodies, or else EU-funded Framework projects, which almost always have multiple partners in multiple countries. The guidelines for establishing and managing multi-partner projects are many, and go beyond the scope of this document. However, a few pointers are included

Guideline Text

- Ensure that all partners are aware of, and have endorsed, their roles and responsibilities within the project. Refresh this knowledge on a regular basis.

- Establish a common mode of communication across partners, and ensure that all partensr receive the information which is aimed at them. Electronic mail is ideal for this purpose, so long as partners read and reply to such mail.

- Subcontractors should be governed by strict commercial contracts, with their deliverables clearly and unambiguously defined.

- The IPR of all partners should be clearly documented and formally signed by all partners. A partnership agreement which clearly states the IP Rights covering material which is being brought to the project, and material which is created by the project, should be agreed in advance of the project commencing.

- Each partner should have a clear role in the project – if a partner's role is not clear, review whether or not the partner is necessary to the project.

Notes/Commentary

The notes above are only a small part of the possible material that could be provided on the establishment and management of multi-partner projects. Partners and suppliers are a major source of delay and confusion within a project – clear agreement and common endorsement of the roles and responsibilities of all partners at all times can help to ameliorate this.

References

Online

- **tasi** has a section on the use of sub-contractors, at **http://www.tasi.ac.uk/advice/managing/manage.html**

Nominated by Minerva Partners

Many of the nominated projects worked with third parties. Some examples are :

- **Denmark :** "The soldier in the Backyard – an interactive children's story on the Internet" **:** http://www.soldatenibaghaven.dk
- **France :**National digitisation programme - annual project calls : http://www.culture.gouv.fr/culture/mrt/numerisation/index.htm
- **Ireland :** ACTIVATE : http://www.activate.ie
- **Italy :** DADDI **:** http://www.uffizi.firenze.it/Dta/daddi-eng.html
- **Italy :** Rinascimento Virtuale -Digitalepalimpsest Forschung (RV) : www.iccu.sbn.it , www.bml.firenze.sbn.it (large network of 42 partners)
- **Italy:** SBNonline **:** http://sbnonline.sbn.it
- **Italy** : S.I.T.I.A : www.archeologia.beniculturali.it
- **Italy** : TRADEX : http://www.tradex-ist.com
- **Potugal** : Endovelliccus : www.ipa.min-cultura.pt
- **Sweden** : The Oxenstierna Project. : http://www.ra.se/ra/Oxenstierna/oxenstierna1.html

Standards

Introduction

This section surveys some of the many technical standards which exist in the digitisation and online publication areas. Some of the most important of these (e.g. the Dublin Core meta-data standard) were created for other domains, but have found application in the digitisation area. Others are 'pure' technology, such as the TIFF, JPEG and GIF image format standards. Others again are 'de facto' industry standards which, while widely supported and used today, may become obsolete in a relatively short period of time.

This section surveys standards which apply to the various stages of the digitisation life-cycle. These include

- **Technology Standards**
- Image format standards
  - TIFF
  - GIF
  - JPG
  - PNG

- Audio Formats
  - WAV
  - MP3
  - Real Audio

- Video Formats
  - MPEG
  - Real Video
  - QuickTime

- 3D Standards
  - VRML
  - Shockwave 3D

- Meta-data Standards
  - Dublin Core
  - Taxonomy / Naming Standards

It should be noted, however, that the list of standards presented here is selective; the guidelines, procedures, models, ontologies, thesauri etc. which exist in this area are very numerous. For example, Minerva Deliverable D6.1 provides links to standards bodies in ISO, CEN etc whose work may be relevant to digitisation projects.

It may also be noted that it is worthwhile for any digitisation project to survey the state of the digitisation art before beginning – this will provide an updated version of the standards which are most widely supported at the time of the project. The standards discussed in this section have already demonstrated longevity, and so can be expected to persist, or else have such a dominant industry position that the size of the user base is expected to dictate support and migration paths, going forward.

Technology Standards

A huge range of technology standards is applicable to, or can be applied to, the digitisation area. This reflects the long history of digitisation and the computer graphics industry, as well as the ability of the IT world to create new standards on an ongoing basis. Practically any area in the IT domain has a wide range and choice of standards covering it. The most relevant from a digitisation project point of view are those which cover

- Images
- Audio material
- Video material
- 3D material

Image Standards

The use of relevant image standards is critical to any digitisation project that wishes to share or publish the image files which it creates. Fortunately, this area has a small number of very dominant standards, and these standards enjoy widespread support.

TIFF (Tagged Image File Format)

This standard is relevant to the creation of high-quality digital images. There is no compression involved, and so TIFF images are typically very large, high-quality files. TIFF output can be anticipated from any scanner or digital camera, either as its native format or (more commonly) as an export option from the proprietary software provided with the hardware.

Master images should be stored in TIFF format unless there is a good reason for using some other format.

The TIFF specification can be found at http://www.dcs.ed.ac.uk/home/mxr/gfx/2d/TIFF-6.ps.gz

JPEG (Joint Photographic Experts Group)

This standard is widely used to deliver images across networks with limited bandwidth, such as the Internet and most intranets. The standard utilizes file compression to reduce

the size of the file being transmitted across the network. The display of JPEG files is supported by all web browsers and by a large number of desktop applications.

JPEG images should be created using image processing software, which imports a TIFF image and exports JPEG images.

For more information on JPEG, see www.jpeg.org, or the user-friendly JPEG FAQ at http://www.faqs.org/faqs/jpeg-faq/

The jpeg specification can be found at http://www.dcs.ed.ac.uk/home/mxr/gfx/2d/JPEG.txt

GIF (Graphics Interchange Format)

In common with JPEG, this format is widely used to deliver images across networks with limited bandwidth, such as the Internet and most intranets. The format utilizes lossless file compression to reduce the size of the file being transmitted across the network. Depending on the nature of the image, GIF or JPEG may be more appropriate. GIF is well suited to cartoons, icons and simpler graphics, JPEG suits scanned photographs and complext images better. However, both are orders of magnitude smaller in file size than TIFF. The display of GIF files is supported by all web browsers and by many desktop applications.

It may be noted that GIF is in fact a proprietary file format, covered by patent.

GIF images should be created using image processing software, which imports a TIFF image and exports GIF images.

The GIF specification can be viewed at http://www.dcs.ed.ac.uk/home/mxr/gfx/2d/GIF87a.txt

PNG (Portable Network Graphics)

PNG images are supported by the most recent versions of the mainstream browsers. They offer a higher quality image than GIF or JPG for many pictures, but at the cost of a somewhat larger file size.

Support for PNG beyond the web technologies area is still somewhat sparse.

PNG images should be created using image processing software, which imports a TIFF image and exports PNG images.

The PNG specification is at http://www.w3.org/TR/REC-png-multi.html

Audio Standards

The standards surveyed briefly here are those most relevant to the web publication of audio material. Their support in the mainstream desktop environment is of great importance, since this decides to a large degree the size of the audience which they will address.

Audio standards for commercial and professional sound engineering are not covered here.

For a general coverage of audio file formats, see the Audio File Format FAQ at http://home.sprynet.com/~cbagwell/audio.html or the Duke University Audio site at http://cit.duke.edu/resource-guides/tutorial-web-multimedia/06-audio-formats.html

WAV

This is the standard Windows audio file format, and is supported by modern versions of Windows using the inbuilt Windows Media Player. As a result it has a very large market penetration.

However WAV is not particularly well suited to the online publication of digitised sound, due to the large file sizes it creates. For instance 1 minute of CD quality audio recorded at 16-bit rate and sampled at 44kHz gives a file size of about 10mb in WAV format.

MP3

This digital audio standard has a large user base, particularly on the Internet, due to its small file size and high quality. It is part of the MPEG family of multimedia standards. It is also supported by the widespread Windows Media Player.
Information on the MP3 standard is available at www.mp3-tech.org

Real Audio

This is a proprietary digital audio format created and supported by Progressive Networks (www.real.com). It has a significant user base due to the free availability of the player software and its early market penetration. File sizes are smaller again than MP3, though the quality of the sound is also slightly less.

Digital Video Standards

Again, this section focuses on the standards for online publication of digitised content. Video is a powerful tool for the presentation of a continuous view of all sides of an object, or for the presentation of three-dimensional spaces, without the need to create full virtual reality content. The availability of economical digital video camera equipment also makes this technology accessible for small or pilot digitisation projects.

The material covered here can be researched in much greater detail at Duke University's comprehensive site (cit.duke.edu).

MPEG (Motion Pictures Expert Group)

This format is popular on web sites, due to the relatively short download time and the widespread availability of player software (including the Windows Media Player). Sound and video are often combined in a single file. MPEG gives high quality and a relatively small file size.

The MPEG standards can be investigated further at www.mpeg.org

Real Video

This is a proprietary format created and supported by Progressive Networks. Its popularity is based on a good quality picture and the free availability of player software. The quality of the image can be adjusted in order to take into account the desired file size. However, the MPEG standard is becoming dominant in this area, and the proportion of online Real Video material is decreasing.
Real Video is accessed at www.real.com

QuickTime

QuickTime is the dominant video format specifically for the Apple platform. The popularity of the Mac in the multimedia domain means that a great deal of material is created and published in this format. Very high quality can be achieved; however, the large size of the files makes it less appropriate for mainstream Internet use.

The QuickTime file format can be accessed at
http://developer.apple.com/techpubs/quicktime/ qtdevdocs/QTFF/qtff.html

3D Standards

The creation and publication of three-dimensional material is a powerful tool for cultural content. This is particularly the case for museums, whose holdings are primarily three-dimensional (3D) objects, and for historic buildings and heritage landscapes.

As noted above, digital video is a low-cost alternative to the creation of true 3D models; however, such an approach does not support the attractive interactive manipulation of objects and exploration of landscapes that a true 3D model enables.

Online 3D technologies are well covered in the site of the Web3D consortium, which includes a range of industry players. See http://www.web3d.org A more casual coverage can be found at www.3dsite.com and at http://www.tnt.uni-hannover.de/subj/vrml/

VRML (Virtual Reality Markup Language).

The VRML standard is the dominant 'official' standard for the modeling of virtual reality and 3D material. Despite having been available for several years, however, its takeup has been sporadic. While several players exist for the browsing of VRML content, it has not yet entered the mainstream desktop in the manner of audio or video. Virtual tours of museums and galleries are relatively common, however, with some excellent examples available online.

In common with video, VRML content cannot usually be 'streamed' to the end user, due the significant size of the files involved. Instead, VR material is downloaded as a compressed (zip) file, and then viewed locally.

The VRML standard is covered in some detail at www.web3d.org

Shockwave 3D.

Shockwave 3D is a new technology allowing 3D models to be imported into 'Macromedia director ' (The industry standard for publishing interactive online/ CD based content). 3D interactive content can then be published as a 'Shockwave' file, viewable by anybody with the latest version of the free, cross platform 'Shockwave' viewer plugin, which has the best market penetration of any plugin technology (estimated at 69.9% of the online market in March 2002)(source: macromedia).

The main disadvantage of Shockwave 3D is that it is not as mature as VRML for creating these kinds of online experiences. S3D does not allow a simple navigational 3D experience to be constructed as easily as VRML. And S3D does not have VRMLs extensible design. Really all that Shockwave 3D does, at present, is it allows a 3D animation to be played back within director and has a few predefined 'behaviours' for camera moves etc. Anything else needs to be scripted from the ground up. Shockwave 3D has the scope to offer all that VRML does, and more, but for the present VRML is a better, faster development environment for small scale projects.

A great deal of information about this popular format is available online. This includes the manufacturer's site at www.macromedia.com as well as third party content such as that at http://www.3dlinks.com/community_shockwave3D.cfm

Meta-data Standards : Dublin Core

The use of meta-data to describe the content of digital files is central to the discovery of particular or relevant items in large collections. Meta-data helps to remove the ambiguity of free-text searching, and to add some semantic aspects which narrow and focus an information retrieval search activity.

In order to be of value, meta-data must follow conventions and standards, so that those searching an information resource can use the same meta-data tags and values as those who create and maintain the resource.

Fortunately, in the information retrieval domain, one standard is very dominant. This, the Dublin Core standard (named after Dublin, Ohio), provides a short list of the most commonly used meta-data terms, as well as an extension mechanism. While Dublin Core was originally intended for libraries, it has been widely adopted on the Internet and across into other domains. It is an official ANSI Standard, Z39.85

A detailed description of the Dublin Core standard, and an exploration of the fields which it includes, can be had from http://au.dublincore.org/documents/dces/ or from www.dublincore.org

Meta-data Standards : Other

There are a very large number of meta-data standards and models available. A partial directory of some of the most important is provided at http://www.ulb.ac.be/ceese/meta/meta.html
In addition, there are major meta-data sites at the WorldWide Web Consortium (http://www.w3.org/Metadata/) and at IFLA (http://www.ifla.org/II/metadata.htm).

Of particular interest is the W3C work on self-describing data, represented by the Resource Description Framework (RDF) standard. See www.w3c.org/rdf. RDF can be used as enabling technology for Dublin Core, for example. See, among others, www.ukoln.ac.uk/metadata/resources/ dc/datamodel/WD-dc-rdf/

Some standards which impinge on the libraries and cultural area include

- Government Information Locator Service (GILS) at http://www.dtic.mil/gils-input/htgi/htgiinp.html
- Computer Interchange of Museum Information (CIMI) model for museums
- Encoded Archive Description (EAD) at http://www.lcweb.loc.gov/ead/
- Text Encoding and Interchange (TEI) at http://www.hti.umich.edu/docs/TEI/
- NCITS L8 proposed draft ANSI standard for meta-data at http://pueblo.lbl.gov/~olken/X3L8/
- Machine-Readable Cataloguing (MARC) at http://www.loc.gov/marc/ and elsewhere.

The range and scope of the meta-data standards varies significantly. A meta-data standard that covers almost any aspect of feasible digitisation projects will already have been created – creating a new one is not recommended.

Despite the range of meta-data standards available, the Dublin Core work is the most widely used and referenced; unless there is a good reason not to, DC fields should be included in whatever meta-data standard a new project utilizes.

Taxonomy and Naming Standards

Significant effort has been invested in the creation of standard taxonomies and naming schemes for the cultural domain. These attempt to enforce some consistency on the semantics of commonly used terms, as well as to identify synonyms and alternative names for the same concept or person.

The Dublin Core meta-data standard, surveyed briefly above, recommends that many meta-data fields be populated from restricted, recognised populations of terms. This greatly facilitates searching for particular information.

The number of taxonomies and naming standards which have been created is quite large – some samples are provided here, but a great deal more information on this topic is available online, at resources such as TASI (Technical Advisory Service for Images) at http://www.tasi.ac.uk and VADS (Visual Arts Data Service) at http://www.vads.ahds.ac.uk

Controlled vocabularies, thesauri and classification systems available on the WWW http://www.lub.lu.se/metadata/subject-help.html.

The High Level Thesaurus Project (HILT) is a clearinghouse of information about controlled vocabularies, including related resources, projects, and an alphabetical list of thesauri. http://hilt.cdlr.strath.ac.uk/Sources/index.html

The Getty Vocabulary Program builds, maintains, and disseminates several thesauri for the visual arts and architecture:

- Art & Architecture Thesaurus® (AAT) http://www.getty.edu/research/tools/vocabulary/aat/
- Union List of Artist Names® (ULAN) http://www.getty.edu/research/tools/vocabulary/ulan/
- Getty Thesaurus of Geographic Names™ (TGN)http://www.getty.edu/research/tools/vocabulary/tgn/

Some other controlled vocabularies:

- Library of Congress Subject Heading List-Available through OCLC, RLG and other cataloging services and on CD ROM from the Library of Congress.
- Thesauri of Graphic Materials I: http://lcweb.loc.gov/rr/print/tgm1/
- Thesauri of Graphic Materials II: http://lcweb.loc.gov/rr/print/tgm2/
- Thesaurus of Graphic Names: http://www.gii.getty.edu/vocabulary.tgn.html

Standards : Conclusion

This section has surveyed some of the most important and relevant standards for digitisation projects. It has focused most on the technology standards which it is anticipated will be most relevant to the target audience. Bibliographic standards are touched upon or not covered at all – this reflects the anticipated expertise of the reader.

It must be emphasized that the number of standards and the material which has been written about them are both very large. The amount of this material which is available online is impressive A targeted online search using a search engine such as Google is likely to fulfill almost any information need in this area. Alternatively, exploration of the references provided in this document will also be fruitful.

Contact Points

Introduction

A large number of digitisation projects have already been carried out in Europe. Many more are underway or planned, as the cultural sector exploits the capabilities of the Internet. For any organisation contemplating or involved in a digitisation project, the likelihood that a similar project has already been carried out is quite high. Time and effort can be saved by carrying out background research before commencing work, or indeed when an issue or obstacle is encountered.

This section provides a list of projects and contact points which it may be fruitful to contact before or during a digitisation project. The contact points have been divided up into sections, in order to simplify finding a relevant web site or contact for any particular question or problem.

Readers are recommended to view the online resources identified here, in order to stimulate ideas, to see how certain problems are dealt with, and to identify individuals or organisations who may be able to help them in their own digitisation efforts.

The following bullet points reprise the digitisation project lifecycle, as discussed earlier in this document.

- Digitisation project planning
- Selection
- Intellectual property and copyright
- Preparation for digitisation
- Handling of originals
- The digitisation process
- Preservation of the digital master material
- Meta-data
- Preparation for publication
- Online publication
- Project Management

It may be noted that several of these areas are common, by default to any digitisation project. There are few digitisation projects which cannot provide guidance, exchange of experience, etc. on project planning, preparation for digitisation, the digitisation process, online publication and selection. And the large majority will also have considered, to some degree, the other aspects listed above.

The lists of references provided in this section identify projects which may be of particular relevant to one or another aspect of the digitisation process. In addition, it has been attempted to include at least one contact point per country for each aspect.

Digitisation Project Planning

There are a large number of resources on the Internet which provide background information on planning a digitisation project, on high-quality digital collections, on how to add value to digital collections, etc. A sample includes

Online

- Northeast Document Conservation Center. *Handbook for Digital Projects: A Management Tool for Preservation & Access*. at http://www.nedcc.org/digital/dighome.htm
- Anne R. Kenney and Oya Y. Rieger. *Moving Theory into Practice: Digital Imaging for Libraries and Archives*. Research Libraries Group, 2000. An online tutorial at http://www.library.cornell.edu/preservation/tutorial/ serves as an introduction to topics covered more extensively in the printed volume
- **Institute of Museum and Library Studies :** *A Framework of Guidance for Building Good Digital Collections* at *http://www.imls.gov/pubs/forumframework.htm* ***(from which many of these links are copied)***.

Nominated by Minerva Partners

- **Austria** : meta-e project http://meta-e.uibk.ac.at/
- **Austria** : digital image archive at www.bildarchiv.at
- **Denmark :** "The soldier in the Backyard – an interactive children's story on the Internet" **:** http://www.soldatenibaghaven.dk
- **Spain** : Biblioteca Virtual Miguel de Cervantes (Miguel de Cervantes Digital Library) : http://cervantesvirtual.com/
- **Spain** : Virtual Sites Re-creation : www.patrimonionacional.es
- **Finland** : Digital historical newspaper Library 1771-1860 (ready), continuing to 1890 : http:// digi.lib.helsinki.fi . The Nordic library: http://tiden.kb.se
- **France** : INA digitisation programme of National Audio-Visual Archives.: http://www.ina.fr/index.en.html
- **Greece :** ODYSSEUS : http://www.culture.gr
- **Ireland :** ACTIVATE : http://www.activate.ie
- **Italy :** DADDI **:** http://www.uffizi.firenze.it/Dta/daddi-eng.html
- **Potugal** : Endovelliccus : www.ipa.min-cultura.pt
- **Sweden** : The Oxenstierna Project. : http://www.ra.se/ra/Oxenstierna/oxenstierna1.html
- **UK :** Compass : http://www.thebritishmuseum.ac.uk/compass

Selection

Online

- Joint RLG and NPO Preservation Conference, Guidelines for Digital Imaging: Guidance for selecting materials for digitisation. http://www.rlg.org/preserv/joint/ayris.html
- Moving Theory into Practice. Digital Imaging Tutorial: Selection. http://www.library.cornell.edu/preservation /tutorial/selection/selection-01.html

- Dan Hazen, Jeffrey Horrell, and Jan Merrill-Oldham. Selecting research collections for digitization (CLIR, August 1998) http://www.clir.org/pubs/abstract/pub74.html
- Towards a Learning Nation: The Digital Contribution. Recommendations proposed by the Federal Task Force on Digitization. Final Report. (December 31, 1997). Part B Issue 2: Selecting materials for digitization. http://www.nlc-bnc.ca/8/3/r3-407-e.html
- DLESE Collections Committee, "How to Identify the "Best" http://www.ldeo.columbia.edu/DLESE/collections/CGms.html
- Columbia University Libraries Selection Criteria for Digital Imaging. http://www.columbia.edu/cu/libraries/digital/criteria.html
- University of California Selection Criteria for Digitization. http://www.library.ucsb.edu/ucpag/digselec.html
- North Carolina ECHO (Exploring Cultural Heritage Online) Guidelines, Section 2: Planning & Selection. http://www.ncecho.org/Guide/selection.htm
- Library of Congress Preservation Reformatting Division *Selection Criteria for Preservation Digital Reformatting*.. http://lcweb.loc.gov/preserv/prd/presdig/presselection.html

Nominated by Minerva Partners

- **Denmark** : Kongens Kunstkammer (Royal Chamber of Art) **: http:** //www.kunstkammer.dk
- **Greece :** ODYSSEUS : http://www.culture.gr
- **Ireland :** ACTIVATE : http://www.activate.ie
- **Italy :** DADDI **:** http://www.uffizi.firenze.it/Dta/daddi-eng.html
- **Sweden** : The Oxenstierna Project. : http://www.ra.se/ra/Oxenstierna/oxenstierna1.html
- **UK :** Compass : http://www.thebritishmuseum.ac.uk/compass

IPR and Copyright

Online

- tasi copyright page : http://www.tasi.ac.uk/advice/managing/copyright.html
- PADI copyright page : http://www.nla.gov.au/padi/topics/28.html
- IFLA copyright page : http://www.ifla.org/II/cpyright.htm
- University of New York, Buffalo, includes many links to copyright pages at http://ublib.buffalo.edu/libraries/units/cts/preservation/digires.html
- Digimarc digital watermarks – www.digimarc.com
- Signumtech digital watermarks – www.signumtech.com
- Audio digital watermarks – www.musicode.com
- Watermarking overview - http://www.webreference.com/content/watermarks/
- General UK copyright information - http://www.copyrightservice.co.uk/copyright/protecting(02).htm
- AHDS has a copyright FAQ at http://ahds.ac.uk/copyrightfaq.htm

Nominated by Minerva Partners

- **Germany** – BAM Portal http://www.bam-portal.de/
- **Greece** : ODYSSEUS : http://www.culture.gr
- **Italy :** DADDI **:** http://www.uffizi.firenze.it/Dta/daddi-eng.html
- **Italy :** Edit16 **:** http://edit16.iccu.sbn.it
- **Italy** *: Mediceo avanti il Principato on line:* http://www.archiviodistato.firenze.it/Map/
- **Italy** : TRADEX : http://www.tradex-ist.com

Preparation for digitisation

Online

- The open source GNU Image Manipulation Program is at www.gimp.org
- Image optimization is addressed at http://www.yourhtmlsource.com/optimisation/imageoptimisation.html
- The University of Oregon provides a very brief look at image optimization at http://libweb.uoregon.edu/it/webpub/images.html as well as a more detailed section at http://www.uoregon.edu/~jqj/inter-pub/images/

- The University of Minnesota provides practical material on image manipulation at http://www.geom.umn.edu/events/courses/1996/cmwh/Stills/manipulating.html
- Montana State University provides guidelines for images in web pages at www.msubillings.edu/tool/Guidelines%20for%20using%20images%20on%20web%20pages.pdf

Virtual Reality Links online

- The VRML standard is covered in some detail at www.web3d.org
- Shockwave 3D is covered at www.macromedia.com and at http://www.3dlinks.com/community_shockwave3D.cfm
- Washington University has a very large, but slightly out-of-date knowledge base on virtual reality at http://kb.hitl.washington.edu/onthenet.html
- The US NIST also hosts a page on virtual reality resources at http://www.itl.nist.gov/iaui/ovrt/hotvr.html
- The AHDS has a guide to VR for cultural bodies at http://vads.ahds.ac.uk/guides/vr_guide/index.html

Nominated by Minerva Partners

- **Austria** : www.bildarchiv.at. (special digital photography setup)
- **Ireland :** ACTIVATE : http://www.activate.ie
- **Italy :** DADDI **:** http://www.uffizi.firenze.it/Dta/daddi-eng.html
- **Italy :** *Diplomatico* **:** http://www.archiviodistato.firenze.it/progetti/attivite.htm
- **Potugal** : Endovelliccus : www.ipa.min-cultura.pt
- **Portugal :** MatrizNet **:** http:// www.matriznet.ipmuseus.pt (museum collection management software, web enabled)
- **UK :** Compass : http://www.thebritishmuseum.ac.uk/compass

Handling of originals

Online

- The Australian Consortium for Heritage Collections and their Environment publishes guidelines at amol.org.au/craft/publications/hcc/ environment_guide/environ_1.pdf (hosted by Australian Museum Online – AMOL)
- AMOL also publishes a FAQ for conservation of artworks; although focused on Australian concernts, it includes much of value, at http://www.amonline.net.au/materials_conservation/faq/
- The University of Melbourne publish a useful guide to conservation, including the handling of fragile materials, at http://home.vicnet.net.au/~conserv/prepast1.htm
- The Preservation Administration Discussion Group covers a range of topics in the digitisation area. It can be found at http://palimpsest.stanford.edu/byform/mailing-lists/padg/

Nominated by Minerva Partners

- Italy : DADDI : http://www.uffizi.firenze.it/Dta/daddi-eng.html
- Italy : Rinascimento Virtuale-Digitalepalimpsest Forschung (RV) : www.iccu.sbn.it , www.bml.firenze.sbn.it
- Sweden : The Oxenstierna Project. : http://www.ra.se/ra/Oxenstierna/oxenstierna1.html

The Digitisation Process

Online

- A good guide to Workflow and process management is on the tasi site at http://www.tasi.ac.uk/advice/managing/jidi_workflow.html
- A user-friendly site on the scanning process is provided at www.scantips.com
- A short overview on how to use a scanner is provided at http://www.aarp.org/computers-howto/Articles/a2002-07-16-scan
- A guide on the basics of using a digital camera is provided at http://www.pcphotoreview.com/basic3040crx.aspx
- The tasi page on hardware and software may be useful – see http://www.tasi.ac.uk/advice/creating/hwandsw.html
- NCSU provide a guide to the practical use of digital camera at http://www.ncsu.edu/sciencejunction/route/usetech/digitalcamera/
- The University of Maryland hosts a major OCR resource at **http://documents.cfar.umd.edu/**
- A brief OCR overview is provided by computerworld magazine at **http://www.computerworld.com/softwaretopics/software/apps/story/0,10801,73023,00.html**

- A worthwhile technical report on OCR is provided by the University of New York, Buffalo, at **http://www.cedar.buffalo.edu/Publications/TechReps/OCR/ocr.html**
- A report on OCR, newspapers and microfilm is provided by IFLA at **http://www.ifla.org/VII/s39/broch/microfilming.htm**

Nominated by Minerva Partners

Any of the nominated projects will have expertise in this area. These include the following

- **Austria's** meta-e project : http://meta-e.uibk.ac.at/
- **Austria** : digital image archive at www.bildarchiv.at
- **Germany** – Digital Conversion Forms : http://www.lad-bw.de
- **Germany** : Workflow and tools for providing access to larger quantities of archival material : http://www.lad-bw.de
- **Denmark** : Kongens Kunstkammer (Royal Chamber of Art) **: http:** //www.kunstkammer.dk
- **Spain** : Biblioteca Virtual Miguel de Cervantes (Miguel de Cervantes Digital Library) : http://cervantesvirtual.com/
- **Spain** : Virtual Sites Re-creation : www.patrimonionacional.es
- **Finland :** Digital historical newspaper Library 1771-1860 (ready), continuing to 1890 : http:// digi.lib.helsinki.fi . The Nordic library: http://tiden.kb.se
- **France** : INA digitisation programme of National Audio-Visual Archives.: http://www.ina.fr/index.en.html **(especially audio and video)**
- **Greece :** ODYSSEUS : http://www.culture.gr
- **Ireland :** ACTIVATE : http://www.activate.ie
- **Italy :** DADDI **:** http://www.uffizi.firenze.it/Dta/daddi-eng.html
- ***Italy : Diplomatico :*** http://www.archiviodistato.firenze.it/progetti/attivite.htm
- **Italy :** Edit**16 :** http://edit16.iccu.sbn.it
- **Italy :** www.pinacotecabologna.it
- **Italy : "**le piazze storiche**": http://cantieri.theranet.it/piazze**
- **Italy :** Rinascimento Virtuale-Digitalepalimpsest Forschung (RV) : www.iccu.sbn.it , www.bml.firenze.sbn.it
- **Italy** : S.I.T.I.A : www.archeologia.beniculturali.it
- **Italy** : Virtual Archaeological Tours around the Lost Cities : http://www.archeologia.beniculturali.it (especially Virtual Reality).
- **Portugal** : Endovelliccus : www.ipa.min-cultura.pt
- **Sweden** : The Oxenstierna Project. : http://www.ra.se/ra/Oxenstierna/oxenstierna1.html
- **UK :** Compass : http://www.thebritishmuseum.ac.uk/compass

Preservation of Digital Master Material

Online

- Reference Model for an Open Archival Information System. http://ssdoo.gsfc.nasa.gov/nost/isoas/overview.html

- Gregory W. Lawrence, William R. Kehoe, Oya Y. Rieger, William H. Walters, and Anne R. Kenney, Risk Management of Digital Information: A File Format Investigation (CLIR 2000). http://www.clir.org/pubs/abstract/pub93abst.html
- Conservation On-Line (COOL) Preservation of Audio Materials. A clearinghouse of resources related to preserving both digital and analog audio. http://sul-server-2.stanford.edu/bytopic/audio/
- The AHDS provides a directory of material on the preservation of digital content at http://www.pads.ahds.ac.uk:81/padsProjectLinksDirectory/PreservationDigitalMaterial
- The Australian PADI initiative hosts a huge range of information on digital preservation, at http://www.nla.gov.au/padi/, particularly at http://www.nla.gov.au/padi/topics/44.html

Nominated by Minerva Partners

- **Germany** – BAM Portal http://www.bam-portal.de/
- **Germany** – Digital Conversion Forms : http://www.lad-bw.de
- **Denmark** : Kongens Kunstkammer (Royal Chamber of Art) **:** http**:** //www.kunstkammer.dk
- **Spain** : Biblioteca Virtual Miguel de Cervantes (Miguel de Cervantes Digital Library) : http://cervantesvirtual.com/
- **Greece :** ODYSSEUS : http://www.culture.gr
- **Italy :** "I dipinti della Galleria Spada": no web site

Meta-data

Online

- Anne Gilleland-Swetland, *Introduction to Metadata : Pathways to Digital Information* (http://www.getty.edu/research/institute/standards/intrometadata)
- The International Federation of Library Association *: Digital Libraries: Metadata Resources*. http://www.ifla.org/II/metadata.htm
- Murtha Baca, ed : *Introduction to Metadata: Pathways to Digital Information* http://www.getty.edu/research/institute/standards /intrometadata/index.html
- **Dublin Core** Initiative: http://dublincore.org
- Open Archives Initiative application of Dublin Core http://www.openarchives.org
- The CIMI Guide to Best Practice for museums using Dublin Core http://www.cimi.org/public_docs/meta_bestprac_v1_1_210400.pdf
- The GEM (Gateway to Educational Materials) application of Dublin Core http://www.geminfo.org/Workbench/Metadata/
- EAD: Encoded Archival Description is set of rules for designating the intellectual and physical parts of archival finding aids so that the information can be searched, retrieved, displayed and exchanged. http://lcweb.loc.gov/ead/

- **Global Information Locator Service**: A standard developed to describe government information resources, generally at the collection or agency level, but also usable at the item level.
- GILS: http://www.gils.net/
- MARC: http://lcweb.loc.gov/marc/
- Library of Congress. Understanding MARC Bibliographic: Machine-Readable Cataloging. (5th Edition). http://lcweb.loc.gov/marc/umb/
- MARC documentation: Extensive documentation is available at the LC site and at OCLC http://oclc.org

- **The tasi page on meta-data is at** www.tasi.ac.uk/advice/delivering/metadata.html
- The Colorado guidelines for meta-data creation and entry are at http://coloradodigital.coalliance.org/glines.html
- PADI's meta-data page is at http://www.nla.gov.au/padi/topics/30.html
- An unusual approach to user-generated meta-data is used at www.gimp-savvy.com
- The Encoded Archival Description (EAD) home page is at www.loc.gov/ead/
- Text Encoding and Interchange (TEI) at http://www.hti.umich.edu/docs/TEI/
- NCITS L8 proposed draft ANSI standard for meta-data at http://pueblo.lbl.gov/~olken/X3L8/

Controlled Vocabularies

- Controlled vocabularies, thesauri and classification systems available on the WWW http://www.lub.lu.se/metadata/subject-help.html.
- The High Level Thesaurus Project (HILT) is a clearinghouse of information about controlled vocabularies, including related resources, projects, and an alphabetical list of thesauri. http://hilt.cdlr.strath.ac.uk/Sources/index.html
- The Getty Vocabulary Programbuilds, maintains, and disseminates several thesauri for the visual arts and architecture:
- Art & Architecture Thesaurus® (AAT) http://www.getty.edu/research/tools/vocabulary/aat/
- Union List of Artist Names® (ULAN) http://www.getty.edu/research/tools/vocabulary/ulan/
- Getty Thesaurus of Geographic Names™ (TGN)http://www.getty.edu/research/tools/vocabulary/tgn/
- Some other controlled vocabularies:
- Library of Congress Subject Heading List-Available through OCLC, RLG and other cataloging services and on CD ROM from the Library of Congress.
- Medical Subject Heading List: http://www.nlm.nih.gov/meshhom.html
- Thesauri of Graphic Materials I: http://lcweb.loc.gov/rr/print/tgm1/
- Thesauri of Graphic Materials II: http://lcweb.loc.gov/rr/print/tgm2/
- Thesaurus of Graphic Names: http://www.gii.getty.edu/vocabulary.tgn.html

Nominated by Minerva Partners

- **Austria's** meta-e project at http://meta-e.uibk.ac.at/
- **Austria** : digital image archive at www.bildarchiv.at (particularly automated indexing)
- **Germany** : BAM portal http://www.bam-portal.de/
- **Finland :** Digital historical newspaper Library 1771-1860 (ready), continuing to 1890 : http:// digi.lib.helsinki.fi . The Nordic library: http://tiden.kb.se
- **Greece :** ODYSSEUS : http://www.culture.gr
- **Italy** : ICONCLASS in Italian : www.iccd.beniculturali.it
- **Italy** : Information Network dei Beni Culturali : www.iccd.beniculturali.it
- **Italy:** SBNonline **:** http://sbnonline.sbn.it
- **Sweden** : The Oxenstierna Project. : http://www.ra.se/ra/Oxenstierna/oxenstierna1.html

Online publication

Online

- Web page design : **http://www.essdack.org/webdesign/**
- Web page authoring : http://www.htmlgoodies.com
- IASL web page awards – a source of ideas : **http://www.iasl-slo.org/web_award.html**
- The Louvre web page : **http://www.paris.org/Musees/Louvre/**
- Sun Microsystems list of library web pages, Europe section : **http://sunsite.berkeley.edu/Libweb/Europe_main.html**

Nominated by Minerva Partners

- **Austria** : digital image archive at www.bildarchiv.at
- **Germay** : BAM Portal http://www.bam-portal.de/
- **Spain** : Biblioteca Virtual Miguel de Cervantes (Miguel de Cervantes Digital Library) : http://cervantesvirtual.com/
- **Italy :** DADDI **:** http://www.uffizi.firenze.it/Dta/daddi-eng.html
- **Italy :** www.pinacotecabologna.it
- **Italy : "**le piazze storiche**": http://cantieri.theranet.it/piazze**
- **Italy** : Virtual Archaeological Tours around the Lost Cities : http://www.archeologia.beniculturali.it (especially Virtual Reality)
- **Portugal** : Endovelliccus : www.ipa.min-cultura.pt
- **Sweden** : The Oxenstierna Project. : http://www.ra.se/ra/Oxenstierna/oxenstierna1.html
- **UK :** Compass : http://www.thebritishmuseum.ac.uk/compass

Project Management

Online

- *RLG/DLF Guides to Quality in Visual Resource Imaging*: 1. Planning an Imaging Project. http://www.rlg.org/visguides/visguide1.html
- Northeast Document Conservation Center. *Handbook for Digital Projects: A Management Tool for Preservation & Access. III: Considerations for Project Management.* http://www.nedcc.org/digital/dighome.htm
- A guide to digitisation project management and workflow is provided at http://www.tasi.ac.uk/advice/managing/jidi_workflow.html

- The Colorodo Digitisation Program has a section on project management at http://www.cdpheritage.org/resource/project%20management/rsrc_project_management.html
- So does Canadian Heritage at http://www.chin.gc.ca/English/Digital_Content/index.html
- AHDS has a section on managing digitisation projects at http://www.ahds.ac.uk
- Chapman, Stephen and William Comstock. "Digital Imaging Production Services at the Harvard College Library." (http://www.rlg.org/preserv/diginews/diginews4-6.html#feature1). RLG DigiNews (Dec. 5, 2000). A look inside the planning and workflow design of a project at the Harvard College Library in 1999.
- Fleischhauer, Carl. *Steps in the Digitization Process.* National Digital Library Program, Library of Congress (1996). (http://lcweb2.loc.gov/ammem/award/docs/stepsdig.html).
- Hughes, Carol Ann. "Lessons Learned: Digitization of the Special Collections at the University of Iowa Libraries." *D-Lib Magazine* (June 2000). (http://www.dlib.org/dlib/june00/hughes/06hughes.html).
- **tasi** has a section on the use of sub-contractors, at **http://www.tasi.ac.uk/advice/managing/manage.html**

Nominated by Minerva Partners

- **Austria** : Meta-e engine for workflow management http://meta-e.uibk.ac.at/
- **Germay** : BAM Portal http://www.bam-portal.de/
- **Denmark :** "The soldier in the Backyard – an interactive children's story on the Internet" **:** http://www.soldatenibaghaven.dk
- **Spain** : Biblioteca Virtual Miguel de Cervantes (Miguel de Cervantes Digital Library) : http://cervantesvirtual.com/
- **Finland :** Digital historical newspaper Library 1771-1860 (ready), continuing to 1890 : **http://** digi.lib.helsinki.fi . The Nordic library: http://tiden.kb.se
- **Greece :** ODYSSEUS : http://www.culture.gr
- **Ireland :** ACTIVATE : http://www.activate.ie
- **Italy :** DADDI **:** http://www.uffizi.firenze.it/Dta/daddi-eng.html
- **Italy :** Rinascimento Virtuale-Digitalepalimpsest Forschung (RV) : www.iccu.sbn.it , www.bml.firenze.sbn.it
- **Italy:** SBNonline **:** http://sbnonline.sbn.it
- **Italy** : TRADEX : http://www.tradex-ist.com
- **Portugal** : Endovelliccus : www.ipa.min-cultura.pt
- **Sweden** : The Oxenstierna Project. : http://www.ra.se/ra/Oxenstierna/oxenstierna1.html
- **UK :** Compass : http://www.thebritishmuseum.ac.uk/compass

Appendix A : Source Material

Introduction

This appendix contains copies of the questionnaires filled out by representatives of the Minerva project member states, nominating projects in their home countries, which are examples of good practice in one more of the following areas :

- Preservation of physical objects via digitisation and electronic surrogates.
- High quality of the digitisation process.
- Metadata and Thesaurus.
- Usability of project results.
- Management of the process and workflow
- Accessibility including copyright issues and web sites

These questionnaires have been used as the key source of material for the references to nominated projects which appear throughout this document. In some cases, the projects are used for reference in areas additional to those for which they were originally nominated – this reflects extra research into the projects themselves, during the creation of this document.

[All questionnaires added here, without modification]