MINERVA

Ministerial Network for Valorising activities in digitisation

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Authors	Karl-Magnus Drake, Hanna Eriksson, Antonella Fresa, Borje Justrell
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Contents

1 Introduction

1.1 Rationale

In December 1999 the eEurope initiative was launched by the European Commission to bring he benefits of the Information Society to all Europeans, followed in June 2000 by the eEurope 2002 Action Plan, agreed by Member States to achieve the previously defined targets. In its objective 3 (Stimulate the use of the Internet), the plan underlines the importance of content industries in creating added value by exploiting and networking European cultural diversity. To strengthen this aspect, both Member States and the Commission have the role to facilitate and ensure the availability of content for digital networks. In particular, within that objective, there is a specific action to "Create a coordination mechanism for digitisation programmes across Member States".

The content industries are indeed a fast growing segment of the European economy, and the European Commission, beginning with the Impact and Info2000 programmes and including the current eContent action, has clearly identified this sector as a priority area. The extensive cultural heritage and linguistic diversity of Europe creates the foundations for a vibrant digital content industry, able to fully exploit the opportunities offered by digital technologies. For this reason, support for digitisation of European digital content is essential, to involve the hundreds of thousands of existing museums, libraries, historic sites, arts bodies and archives. The key objective is to make more accessible and more effectively exploited the wealth of information there contained. The key objectives are:

- to make the cultural and scientific heritage more accessible;
- to exploit the educational potential of digital content;
- to create the conditions for a flourishing digital content industry.

The cultural and scientific heritage of Europe has a significant impact on its social and economical development. Digitisation of these resources becomes then a major activity for increasing and improving access of citizens to information and for preserving European cultural heritage. Furthermore the cultural diversity of Europe can receive an important boost from the availability of digital assets, which can play a crucial point in several fields: education, tourism and media industries. They can also be very effective in promoting cultural diversity and enhancing understanding of different cultural, ethnic or religious backgrounds of communities across Europe.

European countries have already invested significantly in programmes for digitising cultural and scientific content. These activities have included several areas, such as museum objects, archaeological and environmentally important sites, music and audio-visual archives, bibliographic materials, documents and manuscripts. The main challenges are now promoting the uptake of new technologies for the digitisation of cultural and scientific content, ensuring lasting accessibility and preservation, the development of new services and job opportunities. Other important objectives include strengthening the European content industry and stronger support for its co-operation with educational communities, with consequent mobilisation of material and immaterial resources.

The achievement of these goals is threatened by some constraints, creating important risk factors:

- the European content market is fragmented, limiting the growth of the sector;
- technology is rapidly changing, and the absence of widely accepted standards can generate a quick obsolescence of digitised resources;
- access and exploitation of public sector information is not homogeneous;
- the various stakeholders in the digitised content (i.e. owners of intellectual property rights, e.g. original owners, intermediaries, and end-users) have different legitimate interests;
- inadequate provision of multi-lingual content; inadequate reflection of the cultural, social and religious diversity of communities across Europe;
- insufficient co-operation between educational and cultural institutions and the content industry.

As previously underlined, the European Commission is playing an active role in promoting initiatives to support the content industries in the new technological environment: the MEDIA plus programme promotes the audio-visual sector, the eContent action - following the previous INFO2000 and MLIS programmes - promotes the use of digital content linguistic diversity in the information society. The Culture2000 Programme is also an important element for involving and making cultural actors aware of the new opportunities, since it aims to promote cultural dialogue, creativity and the transnational distribution of culture, the promotion of cultural diversity and common cultural heritage, and improving public access to culture. This interest also touches co-operation with other Mediterranean governments: for instance EUROMED and EUMEDIS are initiatives aiming at interconnecting the Euro-Mediterranean research communities and at launching pilot projects in several sectors of intervention, including multimedia access to cultural heritage and tourism, and preservation of cultural heritage. In fact, a closer contact between EU and member states' policy in this field is essential to speed up the process: actions at national level should be interconnected, and complemented by a central co-ordination of digitisation programmes across Europe to ensure wider access to Europe's common heritage.

On 4 April 2001, representatives and experts from the Commission and Member States met at Lund in Sweden to discuss these issues and to make recommendations for actions that support coordination and add value to digitisation activities in ways that would be sustainable over time. The present proposal intends to start from the conclusions, the Lund Principles, available on-line in all EU languages, endorsed by Member States and underlining risks of loosing the opportunities arising from applying new technologies at cultural and scientific content for the future Knowledge Society in line with eEurope Action Plan, and the following meetings held in Brussels on 17th July and Mons on 22nd September under the Belgian Presidency, and to facilitate the adoption of the Lund Action Plan. For this reason, the Member States partners of the MINERVA project commit themselves to identify solutions in order to:

- co-ordinate their strategies and policies for digitisation of cultural content;
- provide a European dimension to their policies and programmes;
- define, exchange and disseminate good practices across the European Union;
- support the development of national and international inventories of cultural and scientific content.

1.2 Outline of the Minerva Project

The **objective** of MINERVA is to create a network of Member States' Ministries to discuss, correlate and harmonise activities carried out in digitisation of cultural and scientific content, for creating an agreed European common platform, recommendations and guidelines about digitisation, metadata, long-term accessibility and preservation. Due to the high level of commitment assured by the involvement of EU governments, it aims to co-ordinate national programmes, and its approach is strongly based on the principle of embeddedness in national digitisation activities. It will also establish contacts with other European countries, international organisations, associations, networks, international and national projects involved in this sector, with a special focus on actions carried out in the DigiCult action of IST. The project will organise an advisory Group, relying on existing actions to identify and integrate best practices in a pan-European framework, to facilitate the adoption of the Lund action plan.

The **work plan** 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.

1.3 What Is the Task?

Objectives

The objectives of work package 6 are:

1. to support the development of skills and increase of efficiency in digitisation by
   a. encouraging take-up of good practice
   b. encouraging promotion of "centres of competence"; the aim is that these "centres of competence" should be sustained by national governments.
2. to support MINERVA/WP 2 - 5 in the selection and identification of guidelines.

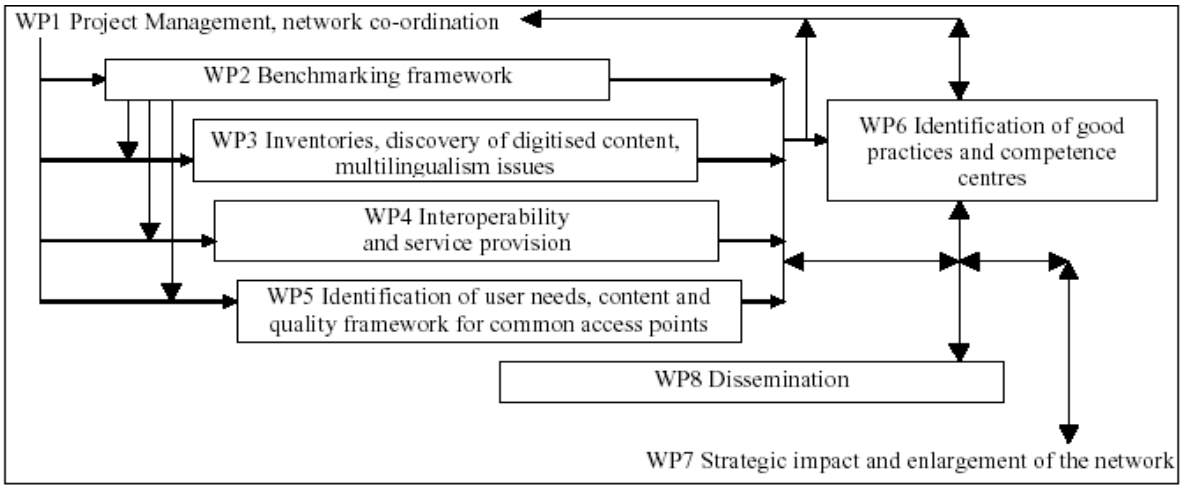

Figure 1: WP 6 in the context of Minerva

1.4 Work To Be Done According To the MINERVA Contract

Activities

Examples of good practice in digitisation will be selected and promoted from, in the first place, Member State programmes and projects in order to

- exchange experiences and skills
- collect consensus from different communities of users

Existing projects in cultural heritage under the IST programme like DigiCULT will also be analysed for potential contribution to good practice.

Organisations and centres with leading skills and competence in key technical domains will be identified and contacted. The purpose is to establish a "consortia" of such organisations with services to support and inform cultural organisations embarking on digitisation. Information about this "consortia" has to be made accessible on the web.

Sequence of work
As a start, existing good practices will be identified and promoted in the short term, with a view to producing a set of consensus guidelines on good practices at a later date in the project. Relevant standards will also be identified and recommendations about their application developed.

As a second activity organisations and centres with leading skills and competence in key technical domains will be identified and contacted.

Deliverables
D6.1 First selection of good practices and competence centres (month 9)
D6.2 Second selection of good practices and competence centres (month 15)
D6.3 Third selection of good practices and competence centres (month 21)
D6.4 Fourth selection of good practices and competence centres (month 27)
D6.5 Fifth selection of goods practices and competence centres (month 33)

1.5 Scope of this document

This is the third deliverable of WP6.

The scope of this document is to describe the results achieved so far by the work package, namely:

- the Good Practices Handbook,
- the selected list of Digitisation Guidelines,
- the on line instruments for the collection of good practices examples and competence centres,
- the feasibility study for the Minerva Knowledge Base.

The following sections illustrate these results.
Additional information can be found on the Minerva web site at:
www.minervaeurope.org

2 Good Practice Handbook

2.1 The dissemination strategy

The final draft of the Good Practices Handbook has been presented at the NRG meeting of Corfu (June 2003) and approved by next NRG meeting in Parma (November 2003).

After this approval, the document has been distributed and discussed among the Minerva Users Community in two occasions[1]:

- the Workshop on Digitisation, which was held on the 29th of October 2003 in Rome, in the frame of the Bibliocom Conference;
- the international conference on Quality of Cultural Web Site, which was held in Parma on the 20th and 21st of November 2003.

At the NRG meeting of Parma (November 2003), the partners decided to produce eventually a lighter version of the Handbook, to be further translated and capillary distributed by the cultural organisations who are approaching the digitisation process and are interested in an "entry-point" information. The target of the Handbook are in particular the small cultural institutions, which have been identified as a strategic target by the NRG.
This lighter version includes the contents described in this section, while any reference to good practices examples is provided only on-line.
The same is for the selected list of Digitisation Guidelines, which are available on line as well, on the Minerva web site.

Concerning the strategy of dissemination and adoption of the Handbook, it is worth to mention that the case of the Good Practices Handbook is particularly relevant for Minerva, because it is the first product and therefore it has had to define procedures and methods; at the WP6 meeting held in Rome on the 5th of June 2003, it has been decided a general framework, starting from a very empirical approach.

The strategy is based on the following general principles:

- the dissemination is necessary to exploit the work done
- the strategy must be agreed among all the NRG members
- the chosen methods should be flexible, feasible and customisable

The dissemination and adoption is based on three phases:

1. The Preparatory phase, while the Handbook is still in draft format
2. The Discussion and Adoption by the NRG,
3. The Dissemination phase, when the Handbook is ready to be disseminated in all the countries

The Preparatory Phase is composed by the following complementary steps:

- Distribution trough e-mail

[1] For further information about these events, please refer to deliverable D7.1 and to the Minerva web site at www.minervaeurope.org

The WG Coordinator sends the documents to all the Members of the working group, in each country, and to the Coordinators of the other working groups, while the Project Manager sends the document to the all the Members of the NRG;

- Opening of the Forum (and/or discussion lists) on the MINERVA web site
  The WG Coordinator nominates the Animator, who is appointed to make all the necessary publicity in order to foster the participation to the on-line discussion;

- Calling for Working Group meeting(s)
  This(these) meeting(s) are aimed at:
  - presenting the Handbook,
  - discussing its contents in the light of the comments and observations collected during the previous period,
  - gathering the agreement of the participants on the draft to be brought to the next NRG.

- Preparation of the file to be discussed at the next NRG meeting
  This work has to be done under the responsibility of the WG Coordinator.
  Attention should be given to the content of the file, its timely distribution to the NRG members and to the allocation of proper time in the agenda of the NRG meeting.

For the Good Practices Handbook, this phase has now successfully completed.

The second phase is the Discussion and Adoption at the NRG meeting.
It has been demonstrated that more than one meeting could be necessary.
In fact, in the case of the Good Practices Handbook, the document has been firstly presented to the NRG in June 2003 in Corfu; then it has been discussed through the members of the Working Group and the Minerva community represented by the User Group; and eventually it has been adopted by the NRG in November 2003 in Parma.

The last phase is very important.
It deals with the real exploitation of the work done and it is referred as the Dissemination phase.
It is based on the following complementary steps:

- diffusion through Ministries
- meetings with professionals
- pointers on other cultural web sites
- announcements on other newsletters
- involvement of other organisations, such as:
  - regions and municipalities,
  - professional associations,
  - private companies,
  - etc.

For the Good Practices Handbook, this phase is still running.

Naturally, the three phases should be considered as a theoretical model of reference. For each case, a possible mix of the steps described above can be envisaged.

2.2 Document Overview

This Handbook is a result of the Minerva project's good practices 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 the Minerva project, including the substantial research represented by the national questionnaires completed in connection with the National Representatives Group (NRG) meeting in Alicante, May 2002.

2.2 Document Structure

The Handbook has the following chapters:

- Background
- Practical Guidelines
- Relevant Standards

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
- Selecting Source Material for Digitisation
- Preparation for Digitisation
- Handling of Originals
- The Digitisation Process
- Preservation of the Digital Master Material
- Meta-data
- Publication
- IPR and Copyright
- Managing Digital Projects

The guidelines are presented in a pragmatic manner, aimed at the hands-on project team.

Complementary and supporting information are available on the Internet at the Minerva web site

www.minervaeurope.org

where 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 are provided.

It may be noted that there are several other sources of guidelines on digitisation and the creation of digital cultural content. The most important ones are noted in the selected list of digitisation guidelines which is a part of this handbook and are available on the Minerva web site as well.

Standards - An overview of the relevant technical standards is provided in a separate chapter. The Minerva team recognises the wide range of standards available, and have not attempted, in this handbook, 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

2.3 Background

2.3.1 The Lund Principles

On 4th of April 2001, representatives and experts from the European 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 principles, called the Lund principles, were transformed into the Lund Action plan, which establishes a list of actions to be carried out by Member States, by the Commission, and by Member States and the Commission jointly, to improve the digitisation landscape across Europe.

2.3.2 The Minerva Project

This document is an output of the Minerva project, which was established in 2002 under the leadership of the Italian Ministry of Culture (IST contract 2001-35461). 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 Minerva project has a number of focused working groups within the overall consortium. Each working group is made up of experts nominated by the 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:

- Interoperability and service provision;
- Inventories, discovery of digitised content, multilingualism issues;

- Identification of user needs, content and quality framework for common access points;
- Identification of good practices and competence centres.

The activities of the working groups include meetings, public workshops, publications (such as this handbook), international coordination and cooperation, etc.

2.4 Practical Guidelines

2.4.1 Introduction

This chapter 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).

The material in this chapter 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 are used as the basis for the breaking down of the guidelines and mirrored in the table of contents.
Each guideline description is structured in the following way:

- A Guideline Title
- An Issue Definition, which sets the scene for the guideline and/or introduces the problem which the guidelines addresses
- 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

Supporting references are available on the Internet web site:
www.minervaeurope.org

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

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. Normally, the following questions have to be answered:

- What (work needs to be done)?
- Who (should do it)?
- Where (should it take place)?
- When (will it take place)?
- How (will it be done)?

A digitisation project should have clearly specified goals and objectives – these will impact directly on the 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.

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 digitisation project.

Pragmatic Suggestions

- The project must have concrete, explicit aims, and 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

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Human Resources

Issue Definition

Before a project can start, it is important that the personnel required to work on the project are 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 required for digitisation projects may be different to from the skills necessary to carry out the tasks for the daily operation. Hardware and software solutions required for a digitisation project, therefore, need to be identified.

Pragmatic Suggestions

- Ensure that sufficient staff is 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 artefacts and documents.
- Carry out, if possible, training by using the hardware and software solution which will be used during the project, before the project commences (vendors sometime offer technical solutions free of charge for training or relevant equipment can be hired short-time).
- 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 artefacts and documents if the resourcing is not properly handled.

Research

Issue Definition

Regardless of the scope of any particular project, it can be assumed that similar projects 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 to avoid issues and obstacles which have been experienced by other projects.

Pragmatic Suggestions

- 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 avoiding mistakes. It can also put the project team in contact with others who have completed similar projects, and give 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, by taking 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.

Risks

Issue Definition

At the start of any project, plans have to be made to guarantee a successful outcome. However, the goal is not to eliminate all risks but to prepare for them by creating a project framework which responds to the unforeseen in a resourceful and effective way. The aim is to create a project with staff and procedures that can accommodate changes. Therefore, all project planning need to have a risk analysis.

Pragmatic Suggestions

- Distribution of digitised images over the Internet is a form of publication, and is by this reason covered by laws of copyright and intellectual property right (IPR). Examples of questions in a risk analysis are:
  - What could be the consequences of using the material without specific permission?
  - Has attempts been made to find the rights holder?
  - If copyright infringement does occur, what would the impact be on the project?

- For public information the legal value of the information is an important issue. What steps have been made to guarantee that a digitised source material is not corrupt and has actually been produced by an authorised institution?

- The authenticity must also be guaranteed. What actions have be undertaken to maintain the image files, and what tools have been used?

- Financing the project could be a problem and, therefore, a potential risk for the possibilities to reach the goals of the project.

- A key question is the level of skill in the project. Is it possible to hire new highly skilled and experienced persons? If not, will it have an effect on the work plan of the project?

Notes/Commentary

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Selecting Source Material for Digitisation

The selection of the material to be digitised is an important decision for any digitisation project. Typically, the ideal choice is to digitise 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 digitise material in line with a syllabus, while a museum may digitise its best-known holdings in order to stimulate visitor numbers or it's 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.

Establish Selection Criteria

Issue Definition

When planning a digitisation project, the choice of which material to digitise 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.

Pragmatic Suggestions

- It is essential to establish criteria for the selection of material to be digitised. The selection criteria must reflect the goals of the overall project. 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, so that the reasons for any decisions to digitise or not to digitise 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 digitised must be considered before selection.

Selection Against the Criteria

Issue Definition

Having established the criteria against which material is selected to be digitised, the actual selection process can take place. This guide suggests how to manage this process.

Pragmatic Suggestions

- Each candidate for digitisation must be evaluated against the selection criteria. In case 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 the digitisation management knowledge base (see chapter Managing Digitisation Projects).

Notes/Commentary

At this stage, the project is engaging with each of the items to be digitised, 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 support 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.

Preparation for Digitisation

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, software for image capture and processing software, as well as software for metadata and quality control. The working environment should be appropriate to the material being digitised, paying special attention, for example, to light, humidity, vibration, disturbance, movement of the originals, etc.

Hardware

Issue Definition

The appropriate technical equipment must be in place for the digitisation to go ahead. Typically this will consist of digital image capture equipment (digital cameras, scanners for books, documents or microfilm, audio and video hardware, if appropriate) connected to an appropriate computing platform (computer, operative system, network, etc**).** Two different digitisation methods, using different hardware, can be distinguished: scanning and the use of digital cameras.

Pragmatic Suggestions

- Appropriate hardware must be installed and its quality and functionality controlled before digitisation begins.
- Relevant test targets should be used for the evaluation of digital image capture devices.
- 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 mosaiced scanning of materials should be avoided. The project should bear in mind that the transportation of large (e.g. A0) scanners is not trivial.
- 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. Most digitisation projects will require a digital camera, for capture of material which cannot be flattened or held on a scanner book cradle.
- If a scanner is used, it should ideally be at least as large as the item to be scanned.
- Image capture (by scanner or digital camera) should be carried out at the highest reasonable resolution. This will often result in very large master files; smaller files can be extracted 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 than at a lower resolution, the high resolution scanning is difficult to justify.

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

- If a digital camera is used, a project shall choose the most powerful and flexible one which can be afforded. 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, three parameters are most important – the number of pixels in the image, the bit-depth, and the quality of the optical lens being used.

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

- A digital camera with a dedicated copy stand should be used. 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

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

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

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

- 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.

- If an item must be scanned in multiple parts, an overlap of several centimetres 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.

Notes/Commentary

The hardware used is a major constraint on the quality of the end result of any digitisation project. Unless the project is digitising 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 analogue 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, renting 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.

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).

Pragmatic Suggestions

- When the scanner or the digital camera is turned on a calibration routine should start automatically.

- Suitable image processing software will be needed to utilise 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 depend 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.

- 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 standardsJPEG 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.

- 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.

Environment

Issue Definition

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

Pragmatic Suggestions

- 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.

- 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 humidity 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.

Handling of Originals

This section considers how a digitisation project should treat the material which is being digitised. 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.

Moving and Manipulating 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 takes 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.

Pragmatic Suggestions

- Consult the person usually responsible for the source material, before moving or handling it. Include any information on appropriate handling, in the digitisation project knowledge base (see chapter Digitisation Process Management)

- 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.

- Avoid unbinding of bounded books and records. Use instead of a flatbed scanner a scanner with a book cradle or a digital camera.

- Always remove staples, paper clips, and other fasteners; they can damage both the digitisation devices and the source material.

- Expert advice (e.g. from the curator of the item to be digitised) should be sought before any handling of the original.

- 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.

Notes/Commentary

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

The Digitisation Process

This chapter provides some practical guidelines for the actual digitisation process. The technical solutions for digital capture can differ. Scanners, digital cameras or software applications for optical character recognition (OCR) are areas covered in some detail, as being most relevant to the largest number of projects. The digitisation of transparent originals like microfilm is not considered.

Using Scanners

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 established. Larger models (up to A0) of flatbed scanners and scanners equipped with book cradles are very expensive and thus require long-term projects/programs, high-volume digitisation., or oversized source material.

Pragmatic Suggestions

- 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 on the flatbed scanner or the scanner equipped with a book cradle in one piece.
- If it is necessary to scan an item in multiple parts, ensure that there is sufficient overlap to allow the image to be reassembled, during post-processing (by using mosaicing software).
- 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 file name 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.
- 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.

- Scan at the highest resolution and bit-depth that is feasible given the reasons for the project, the limitations of the scanner, the conditions for data storage, and the attributes of the source material (see chapter 4.4.2).

- 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 digital image and of metadata is important – at scanning time is the most convenient time to address any quality issues. The following points may be borne in mind:

  - Establish minimum resolution and colour parameters (mainly the spatial resolution and the bit-depth) 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 reliably calibrated. Avoid having other material on and around the screen, which may affect the perception of the item

  - Master images must be created with visible scaled rulers, and colour or greyscale images must include also a standardised colour/greyscale reference target.

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.

Using Digital Cameras

Issue Definition

The use of digital cameras is becoming increasingly common in digitisation projects. This reflects their flexibility in terms of being able to digitise non-flat objects, such as bound books, folded or wrinkled manuscripts, and 3D objects. However, a scanner equipped with a cradle is normally to prefer when digitising bounded books and over-sized material like maps and drawings.

Pragmatic Suggestions

- Consider renting a high-quality camera, if the scope of the project is limited.
- Put up the digital camera on a motorized carriage on a column and place the items to be digitised on a steady copy stand board 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 images of different parts or sides of an item – this can lead to erroneous impressions of colour variation.
- Use apochromatic lenses and appropriate lens filters to combat colour misregistration and image 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 mass-produced low-end consumer products.

Software Applications for 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 (bit mapped image file), and exports them as ASCII text files, rather than as image files. This enables searching, indexing, format conversion, and other data processing operations to be carried out.

Pragmatic Suggestions

- 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

Relevant products in this market include

- OmniPage
- TextBridge and
- Adobe Capture.
- Abby FineReader

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

Preservation of Digital Master Material

In the longer term, it is an important goal of any digitisation project to protect and keep accessible 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 and corresponding metadata helps to avoid having to re-digitise any items, thus protecting the fragile source material and avoiding repetition of the labour-intensive digitisation process including generating metadata.

File formats

Issue Definition

The digital output of the digitisation process is usually a master file in uncompressed TIFF format with some metadata embedded (see chapter The Scope of Meta-data Used For Object). The file format as well as the compression used will have a major impact on the usability of the digitisation output. At this time, issues such as file format, standards file size, network transmission time, and different kind of outputs (monitor or printer) need to be taken into account.

Pragmatic Suggestions

- 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 digital images 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

- 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 master file, smaller versions can be created using image processing software, either in TIFF, or more commonly in a delivery format such as JPEG 2000, PNG or GIF (see the section on image standards, later in this document).

- More information on file formats is provided in the survey of standards provided later in this document (see chapter Standards).

- 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 exchange of raster image files and corresponding embedded metadata as well as 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.

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 Domes day book initiative have been lost due to media obsolescence.

Pragmatic Suggestions

- 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 be stored on removable media, separate to other data on the server.

- All master files (including metadata) should normally be backuped on two kinds of media separately stored.

- Currently (early 2003), the use of CD-Rs 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 magnetic tape media like 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 primarily 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.

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.

Pragmatic Suggestions

- 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 data 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

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Meta-data

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.

The selected meta-data model is of particular importance as it influence the choice of attributes to describe an object. Related to this is the choice of a standard model, as it is described in the following chapter on standards .

The Scope of Meta-data Used For Object Description

Issue Definition

Before selecting a metadata model for a digitisation project, the material to be described with the metadata 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 an existing meta-data model and the important meta-data for your project.

Pragmatic Suggestions

- The use of appropriate metadata is very important for enabling search and retrieval of material from digital collections. This is even more the case when searching across multiple collections, stored in different locations, is the overall objective (logical union catalogues, virtual combined museums, etc.).

- There exist already many meta-data models. Therefore, each project has to choose as meta-data model based on its own goals. It is advisable to avoid creating a new one, unless the requirements of your project are badly underserved by all existing standards.

- Time spent modelling 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

Of particular importance are the metadata models to be selected for a digitisation project -the choice of which set of attributes that will be used to characterize the works and items to be digitised, the resulting images, the description of the undertaken processes, techniques and technology, the rights management, etc.

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.

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.

Pragmatic Suggestions
- 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.

Publication

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 downloads, to fit the operational characteristics of the Internet.

Image Processing

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.

Pragmatic Suggestions

- 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, 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 found 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.

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.

Pragmatic Suggestions

- 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 as 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.

Online Publication

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.

Pragmatic Suggestions

- 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

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.

IPR and Copyright

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.

Establishing Copyright

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

Pragmatic Suggestions

- 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.

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.

Pragmatic Suggestions

- 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 75 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.

- 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.

Managing Digitisation Projects

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.

Digitisation Process Management

Issue Definition

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

Pragmatic Suggestions

- 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

- Develop a digitisation project knowledge base that can be 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.

- The name, identifier and other relevant information for each item to be digitised should be entered 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.

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.

Pragmatic Suggestions

- 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.

Staff Training

Issue Definition

Unless the staff working on the project has significant experience from prior 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.

Pragmatic Suggestions

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

- Ensure that the training requirements of the staff on the project are identified at the start of the project, i.e. already in the planning phase. 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 training.

- 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 is removed from the project and new personnel start to work. 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.

Working with Third Parties for 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.

Pragmatic Suggestions

- 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 is 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.

Working with Third Parties in Cooperative Projects and Content Sharing

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

Pragmatic Suggestions

- 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 partners 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 avoid this.

Costs

Issue Definition

Building a digital collection is normally very expensive. Projects, therefore, have to take into account all start-up and infrastructural costs as well as costs for running the project. That means costs for initial planning, data specifications, tracking and documentation systems, staff training, and so forth, as well as the incremental cost for digitising the actual source material.

Pragmatic Suggestions

- Digitisation projects should consider the following costs involved in the design, implementation and maintenance of a digital collection:
  - Staff development
  - Facilities needed
  - Operational costs
  - Costs for storage and for delivery systems
- Staff development includes salaries for project management, web programmer, educational officer, technical support, etc. but also travel costs and training
- Costs for facilities are often connected to questions concerning required functionalities and the need for tradeoffs. Projects have for instance to decide whether keeping costs on a low level is more important to the overall success of the project than achieving the highest possible standard for image capture.
- Operational costs to consider are:
  - Time for handling source material (from shelf to image capture device and back again) as a percentage of total salary cost per day.
  - Preparation of source material (conservation, cleaning etc).
  - Capture time (from set-up to naming and saving) provided as a percentage of the operators total salary costs per day.
  - Cataloguing and handling of metadata as a percentage of total salary costs.
  - Hardware and software cost per digitised item (preferably based on depreciations or replacements costs rather than acquisition costs.
  - Quality assurance time as a percentage of salary costs.
  - Hardware and software maintenance.
  - Technical support time related to capture.
  - Project management time related to capture.
  - Training related to capture.
- Be aware of that image capture often is the least costly part of a digitisation project. On average, one third of total costs are connected to digital convention, slightly less than one third to creation of metadata, a bit more then one third to administrative and quality assurance tasks. The rest is long term maintenance costs.
- Storage costs to consider should normally be total costs for maintenance per gigabyte.

Notes/Commentary

Sustainability in the long term is often pushed down the list of priorities by more immediate and pressing concerns. Regardless of the quality and robustness of the digital resources created by a digitisation project, they will not last long if the project in mind cannot find funds for their maintenance.

2.5 Standards

2.5.1 Introduction

This chapter 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 technology standards. For meta-data standards and taxonomy and naming standards, please, refer to the work of the Minerva working groups on "inventories, discovery of digitised contents, multilingual issues and to the Technical Guidelines. It should be noted that the list of technology standards presented here is selective. The link with the work of standardisation bodies in ISO, CEN, etc. may be relevant to digitisation projects. Please, refer to Minerva Deliverable D6.1 for further information about these links. 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 fulfil almost any information need in this area.

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.

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

Standards which are widely used, preferable ISO standards, should be used.

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)
TIFF (latest version 6.0) is a proprietary format. The ISO standardised TIFF/EP is valid to TIFF (6.0). 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.

A 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 ISO-standard is widely used to deliver images across networks with limited bandwidth, such as the Internet and most intranets. The standard utilizes mostly "lossy" 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 can be created from TIFF images, using image processing software.

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

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

JPEG2000
The ISO-standardised JPEG2000 format is the successor of the above traditional JPEG format. Contrary to the technology of JPEG, JPEG2000 technology provides very high "lossy" or "lossless" compression without compromising image quality. The layered (multi-resolution) structure of JPEG2000 can eliminate the need to maintain several different resolution version of the same images in an images database (i.e. just ***one*** "global" image could be used as a master file as well as a surrogate image for web access).

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 complex 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 can be created from TIFF images using image processing software.

A 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 44 kHz 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 take-up 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 plug-in, which has the best market penetration of any plug-in 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

3 Digitisation Guidelines: selected list

This section describes the list of existing Digitisation Guidelines, which has been produced in the frame of the activities of WP6, as an accompanying information for the Handbook.
In order to improve the usability of this information, being its mostly based on Internet addresses, the list will be made available on line.
The Handbook naturally included and highlight the fact that the information is available online, on the Minerva web site.

3.1 Selection criteria

The list is not exhaustive but wants to be selective. The list is limited to guidelines for digitization of paper based on documentary heritage, that is manuscripts, printed books and photographs of libraries, archives and museums, not for digitization of multimedia materials. Toolbox and tutorial have been included too, considering these learning resources as valuable as guidelines
The selected Guidelines have been produced by public and private institutions: some are for guiding the digitization projects, others are related to digitization programs where the Guidelines want to reach the strategy and mission of single institutions: the criteria followed for inclusion was that of general interest for professionals worldwide.

The list of digitization guidelines is a work in progress, to be updated constantly.
For updating, see: http://www.minervaeurope.org/guidelines.htm.

The data chosen for description are: Author, Contributor (if existing), Title, Description, Date, Format and URL. The presentation is in alphabetical order by author. We welcome your comments and suggestions.

3.2 The list

AHDS (Arts and Humanities Data Service)

- *Guide to Good practice in the Creation and Use of Digital Resources*
  Available formats: HTML
  http://www.ahds.ac.uk/guides
  Guidelines for: Archaeology, History, Performing Arts, Textual Studies, Visual Arts. Each of these Guides includes tips for discovering and re-using digital data, information about creating and managing new digital data, and guidance to ensure proper preparation and documentation of this data for long term archiving

- *Managing Digital Collections*
  Available formats: HTML
  http://ahds.ac.uk/managing.htm
  This guide gives a framework of strategies and standards for developing, managing, and distributing high-quality digital collections.

British Library

- *Objectives of Digitization*
  Available formats: HTML

http://www.bl.uk/about/policies/digital.html#one
The policy covers all materials originally produced in non-digital form (e.g. printed matter of all kinds, manuscripts, photographs, drawings, paintings, sound recordings, microforms), the digitization of which would fulfil one or more of the desired objectives. It includes objectives, scope, context and BL examples.

- *Preservation and digitization: principles, practices and policies*
  Available formats: HTML; PDF; print publication
  http://www.bl.uk/services/preservation/freeandpaid.html
  Realised by NPO (National Preservation Office), this is a series of guidelines whose aim is to provide an independent focus for ensuring the preservation and continued accessibility of library and archive material. Free and paid material is offered.

CHIN (Canadian Heritage Information Network)

- *Creating and managing digital content* (April 2002)
  Available formats: HTML
  http://www.chin.gc.ca/English/Digital_Content/Capture_Collections/index.html
  Series of Guidelines for creating and maintaining a digitization project. The titles include:
  - Capture your collections,
  - Web site development,
  - Web site development resources,
  - Intellectual Property,
  - Collection Management,
  - Standards.

- *Producing Online Heritage Projects* (August 2002)
  Available formats: HTML
  http://www.chin.gc.ca/English/Digital_Content/Producing_Heritage/index.html
  This handbook is for heritage professionals who are developing online content, and helps them to achieve the benefits available from Web-based education and promotion. It focuses on skills needed for the creation, management and presentation of digital content. The index includes:
  - Project planning,
  - Project development,
  - Getting ready to launch,
  - Product maintenance

  Annexes: Glossary, Bibliography, Project manager's tools and templates.

- *Program Guidelines* (April 2002)
  Available formats: HTML; PDF
  http://www.chin.gc.ca/English/Members/Vmc_Investment_Program/guidelines.html
  Virtual Museums of Canada Investment Program. It includes:
  - Operating principles;
  - Performance indicators;

- Governance structures;
- Content policy;
- Skills development.

Annexes: Guidelines for calculating cost/values.

- *Capture your collections. Planning and implementing digitization projects* (April 2002)
  Available formats: HTML; PDF
  http://www.chin.gc.ca/English/Digital_Content/Managers_Guide/index.html
  Modules and sections of a on line course on digitization. It includes:
  - Project planning;
  - Legal Issues related to Digitization;
  - Determining the costs of a Digitization Project;
  - Standards and Guidelines to Consider;
  - Implementation;
  - Maintenance/Management;

CLIR (Council on Libraries and Information Resources)

- Abby Smith. *Building and sustaining digital collections: models for libraries and archives* (August 2001)
  Available formats: HTML; print publication
  http://www.clir.org/pubs/abstract/pub100abst.html
  This guide brings together libraries, museums and academic communities. The focus is on scholarly publishing, with presentations of business models. This is an agenda for:
  - develop sound selection criteria;
  - identify online audience;
  - manage intellectual property rights;
  - develop and share best practices for technological issues;
  - implement cost recovery strategy;
  - manage the institutional transformation.

Colorado Digitization Project

- *Digital Toolbox* (2002-2003)
  Available formats: HTML
  http://www.cdpheritage.org/resource/toolbox/index.html
  The purpose of this toolbox is to introduce cultural heritage institutions to the range of issues associated with digitization of primary source materials. Provides links to general resources, bibliographies, initiatives, and clearinghouses on selection, scanning, quality control, metadata creation, and other project management issues. Also offers a glossary of digital imaging terms.

Cornell University Library

- *Moving theory into practice: Digital imaging tutorial* (2002-2003)
  Available formats: HTML; PDF
  http://www.library.cornell.edu/preservation/tutorial/contents.html
  This tutorial, produced also in Spanish and French, includes:
  - Basic terminology,

- Selection,
- Conversion,
- Quality control,
- Metadata,
- Technical Infrastructure,
    - Digitization chain
    - Image creation
    - File Management
    - Delivery
- Presentation,
- Digital Preservation,
- Management,
- Continuing Education.

CUL (Columbia University Libraries)

- Annr R. Kenney - Stephen Chapman. *Digital Imaging for Libraries and Archives*
  Available formats: HTML; print publication
  http://www.library.cornell.edu/preservation/dila.html
  The volume begins with a theoretical overview of the key concepts, vocabulary, and challenges associated with digital conversion of paper-and film-based materials. This is followed by an overview of the hardware/software, communications, and managerial considerations associated with implementing a technical infrastructure to support a full imaging program. Additional chapters present information on the creation of databases and indexes, the implications of outsourcing imaging services, converting photographs and film intermediates, issues associated with providing long-term access to digital information, and suggestions for continuing education.

- *Selection Criteria for Digital Imaging Projects* (January 2001)
  Available formats: HTML
  http://www.columbia.edu/cu/libraries/digital/criteria.html
  The criteria listed are important to assure that issues of technical feasibility, intellectual property rights, and institutional support are considered along with the value of the materials and the interest of their content.

- *Technical Recommendations for Digital Imaging Projects* (1997)
  Available formats: HTML
  http://www.columbia.edu/acis/dl/imagespec.html
  Prepared by the Image Quality Working Group of ArchivesCom, a joint Libraries/AcIS committee. This document provides recommendations for image quality, file formats, and other capture and storage issues when converting paper, photographic and other physical materials into digital form.

- *Guidelines for Providing Access to Digital Images* (2001)
  Available formats: HTML
  http://www.columbia.edu/cu/lweb/projects/digital/policy.html
  Access to digital images should be provided in the most open level, consistent with the protection of intellectual property rights, and compliant with the local policies on the exercise of such rights

DLF (Digital Library Federation)

- *Digital library standards and practices* (October 2002. Last revision)
  Available formats: HTML
  http://www.diglib.org/standards.htm
  The DLF documents and promotes adoption of standards and best practices that support the effective acquisition, interchange, persistence, and assessment of digital library collections and services.

- *Guides to Quality in Visual Resource Imaging* (July 2000)
  Available formats: HTML
  http://www.rlg.org/visguides/
  This guide includes:
  - Introduction
  - Planning an Imaging Project, by Linda Serenson Colet
  - Selecting a Scanner, by Don Williams
  - Imaging Systems: the Range of Factors Affecting Image Quality, by Donald D'Amato
  - Measuring Quality of Digital Masters, by Franziska Frey
  - File Formats for Digital Masters, by Franziska Frey

DLM Forum

- *Guidelines on Best Practices for Using Electronic Information: How to Deal with Machine Readable Data and Electronic Documents* (1996 first edition; 1997, updated and enlarged edition)
  Available formats: HTML
  http://europa.eu.int/ISPO/dlm/documents/guidelines.html
  The DLM Forum, organised jointly by the Member States of the European Union and the European Commission in Brussels in December 1996, brought together experts from industry, research, administration and archives to discuss a topic of ever increasing importance: the memory of the information society.
  The Guidelines include:
  - from data to structured electronic information;
  - information life cycle and allocation of responsibilities;
  - design, creation and maintenance of electronic information;
  - short and long term preservation of electronic information;
  - accessing and disseminating information.

  Annexes: Terminology, Checklist for electronic information strategy, How to select metadata, Standards.

eLib

- *Preservation Studies (Supporting Studies)* (1998-2000)
  http://www.ukoln.ac.uk/services/elib/papers/supporting/
  Managed by the British Library Research and Innovation Centre, the series Preservation Studies offer several reports on creating and preserving digital image collections. One of the goals is to compare various digital preservation strategies for different data types and formats. Studies included are:
  - John Bennett. A framework of Data Types and Formats, and *Issues affecting the long term preservation of digital material*
    Available formats: HTML; PDF
  - Monika Blake - David Haynes - Tanya Jowett - David Streatfield. *Responsibility for Digital Archiving and Long Term Access to Digital*

Data
Available formats: HTML; PDF

- Seamus Ross - Ann Gow. *Digital Archaeology: Rescuing Neglected and Damaged Data Resources*
  Available formats: Executive summary: PDF; Full Study: PDF
  (Mounted 15 November 1999)
- Alan Poulter. *Preservation of digital materials; policy and strategy issues for the UK*
  Available formats: HTML
- Denise Lievesley - Simon Jones. *An Investigation into the Digital Preservation needs of Universities and Research Funders*
  Available formats: HTML (mounted 11 November 1998)
- Neil Beagrie - Dan Greenstein. *A Strategic Policy Framework for Creating and Preserving Digital Collections*
  Available formats: HTML; PDF; RTF
- Tony Hendley. *Comparison of methods of digital preservation*
  Available formats: PDF; HTML; RTF

The Getty Trust

- *Introduction to Vocabularies* (2000)
  Available formats: HTML
  http://www.getty.edu/research/institute/vocabulary/introvocabs/
  The tutorial is an introduction to the topic of vocabularies and related issues - documentation, standards, and access

- Murtha Baca. *Introduction to Metadata: pathways to digital information* (May 2000)
  Available formats: HTML; PDF; print publication
  http://www.getty.edu/research/institute/standards/intrometadata/
  Version 2 of the guide, which rather than including a single crosswalk as in the previous version, is now offering a "suite" of metadata crosswalks that map different sets of metadata. The author will continue to add to and revise this section as developments arise in the development of metadata schemas that are still evolving (e.g. Dublin Core Qualified, VRA Core 3.0).

HATII (Humanities Advanced Technology and Information Institute) and NINCH (National Initiative for a Networked Cultural Heritage)

- *The NINCH Guide to Good Practice in the Digital Representation & Management of Cultural Heritage Materials* (October 2002 - Version 1.0 First edition)
  Available formats: HTML
  http://www.nyu.edu/its/humanities/ninchguide/
  The Guide describes the process of creating and distributing digital collections and looks at mechanisms by which the institution that created or holds digital collections can manage them to maximum advantage. It includes:
  - Project planning
  - Selecting materials
  - Rights management
  - Digitization and encoding of text
  - Capture and management of images

- Audio/Video Capture and Management
- Quality Control and Assurance
- Working with others
- Distribution
- Assessment of Projects by User evaluation
- Digital Asset Management
- Preservation

In Appendixes: Equipment, Metadata, Digital Data Capture: Sampling

Harvard University Library

- *Selection for digitization: a decision making matrix* (December 1997)
  Available formats: HTML; PDF
  http://www.clir.org/pubs/reports/hazen/matrix.html
  A decision making matrix, produced as imagine, for guiding professionals in the selection. It is included in the Harvard program: Library preservation resources principles and guides.

IMLS (Institute of Museum and Library Services)

- *A Framework of Guidance for Building Good Digital Collections* (November 2001)
  Available formats: HTML
  http://www.imls.gov/pubs/forumframework.htm
  Indicators are listed for Digital objects, Metadata, Collections and Projects, within the context of networked services. Report of the IMLS Digital Library Forum on the National Science Digital Library Program
  Reference in: Priscilla Caplan et al. (2001)

Library of Congress

- *Digital strategy for the Library of Congress* (2000)
  Available formats: HTML; print publication; e-book
  http://www.nap.edu/catalog/9940.html
  LC21: A Digital Strategy for the Library of Congress discusses challenges and provides recommendations for moving forward at the Library of Congress. Topics covered include:
  - Digital collections,
  - Digital preservation,
  - Digital cataloging (metadata),
  - Strategic planning,
  - Human resources,
  - General management,
  - Budgetary issues

- *Challenges to Building an Effective Digital Library*
  Available formats: HTML
  http://memory.loc.gov/ammem/dli2/html/cbedl.html
  The staff of the NDLP (National Digital Library Program) at the Library of Congress have identified ten challenges that must be met if large and effective digital libraries are to be created during the 21st century. The challenges are grouped under the following broad categories:
  - Building the resource,

- Interoperability,
- Intellectual property,
- Providing effective access,
- Sustaining the resource.

- *Technical Notes by Type of Material*
  Available formats: HTML
  http://memory.loc.gov/ammem/dli2/html/document.html
  The notes provide general comments on digital reproductions of textual materials for American Memory, including:
  - Searchable text
  - Textual material available for use in DLI-Phase II
  - Challenges faced by NDLP (National Digital Library Program)

- *Background Papers and Technical Information*
  Available formats: HTML
  http://memory.loc.gov/ammem/ftpfile.html
  These versions represent the final document of NDL Requests for Proposals for scanning and text conversion services . Contracts have been awarded for the work described in the Requests for Proposals.

- *Manuscript Digitization Demonstration Project. Final Report* (October 1998)
  Available formats: HTML
  http://memory.loc.gov/ammem/pictel/
  The Manuscript Digitization Demonstration Project was sponsored by the Library of Congress Preservation Directorate and was carried out in cooperation with the NDLP from 1994 to 1997. The questions framed are:
  - What type of image is best suited for the digitization of large manuscript collections, especially collections consisting mostly of twentieth century typescripts?
  - What level of quality strikes the best balance between production economics and the requirements set by future uses of the images?
  - Will the same type of image that offers high quality reformatting also provide efficient online access for researchers?

- *Lessons Learned: National Digital Library Competition* (January 2001)
  Available formats: HTML
  http://lcweb2.loc.gov/ammem/award/lessons/lessons.html
  LC/Ameritech award winners are learning many lessons about digitization projects in the implementation of their award. To help award-winners, digital project managers, and others interested in this emerging field, the competition staff has summarized, extracted, and paraphrased points from some of the interim reports submitted by awardees. These include:
  - Formats and specifications for digital reproductions,
  - Production workflow and project Management,
  - Intellectual access.

- *Conservation Implications of Digitization Projects*
  Available formats: HTML
  http://memory.loc.gov/ammem/techdocs/conservation.html
  This paper was written by a group of Library of Congress conservators who

have worked closely with NDLP digitization projects and NDLP project leaders since the beginning of the program in 1995. The multi-faceted and precedent setting role which conservation plays in digital image conversion projects in the NDLP in the areas of consultation, training, and treatment for scanning is discussed.

NARA (National Archives and Records Administration)

- Steven Puglia. *Guidelines for Digitizing Archival Materials for Electronic Access* (January 1998)
  Available formats: PDF
  http://www.archives.gov/research_room/arc/arc_info/guidelines_for_digitizing_archival_materials.pdf
  These guidelines have been realised to provide a method for evaluating quality of images produced, to estimate the data storage for access files (on line) and master files (off line), and to assist in determining upgrades of NARA infrastructure. Differences in document type dictate differences in approach to scanning; specifications are given for: textual documents, photographs, maps, plans and oversized records, graphic records.

National Library of Australia

- *Digitization of traditional format library materials. Standards and Guidelines*
  Available formats: HTML
  http://www.nla.gov.au/digital/standards.html
  These guidelines, created for National Library staff , provide advice on digitization projects.
  They focus on creating digital images and displaying them on the Web, including metadata and preservation issues

- *Preserving Access to Digital Information (PADI)*
  Available formats: HTML
  http://www.nla.gov.au/padi/
  The PADI site, offers a subject gateway to digital preservation resources. Includes current information on digital preservation-related events, organizations, policies, strategies, and guidelines. Also includes glossaries of terms that are relevant to digital information.

NEDCC (Northeast Document Conservation Center)

- Maxine Sitts. *Handbook for Digital Projects: A Management Tool for Preservation and Access* (December 2000)
  Available formats: PDF; print publication
  http://www.nedcc.org/digital/dman2.pdf
  Web resource providing information on the issues surrounding the digital conversion of collection materials. With contributions from many of the School for Scanning series presenters, it provides information on project selection and management, technical and copyright considerations, digital longevity and includes commentary on the transformation in scholarly access and preservation tenets required to fully utilize and maintain digital images. Given at NEDCC's school for scanning conferences, Andover, MA. It includes:
  - Rationale for digitization and preservation,

- Considerations for project management,
- Selection of materials for scanning,
- Overview of copyright issues,
- Technical primer,
- Developing best practices: guidelines from case studies,
- Vendor relations,
- Digital longevity,
- Scholar commentary.

NINCH (National Initiative for a Networked Cultural Heritage)
see **HATII**

Nordinfo. NDLC

- *Guidelines on the Establishment of Digitization Services* (July 1997 /updated November 2000)
  Available formats: HTML
  http://www.nordinfo.helsinki.fi/publications/nordnytt/nnytt3-4_97/solbakk.htm
  It includes:
  - Digitising documents where the original is on paper or film base
  - Digitising audio
  - Digitising video

NSDL/SMETE (Science Mathematics Engineering and Technology Education)

- *NSDL Metadata primer* (Last revision January 2003)
  Available formats: HTML
  http://metamanagement.comm.nsdlib.org/outline.html
  The National SMET (Science, Mathematics, Engineering and Technology Education) Digital Library (NSDL) is being constructed to support excellence in SMET for all Americans. NSDL is a comprehensive information system built as a distributed network and will develop and make accessible high quality collections. Reference: C. Manduca, F. McMartin, D. Mogk, Pathways to progress: vision and plans for developing the NSDL (2001): http://doclib.comm.nsdlib.org/PathwaysToProgress.pdf this primer is intended to serve NSDL partners and collaborators as they work with NSDL staff to make their metadata available through the NSDL Metadata Repository. Its primary clientele are those NSDL-funded projects which are at the beginning stages of awareness and use of metadata, but there are also sections that will be useful to others.

- *NSDL Building collections* (October 2002)
  Available formats: HTML
  http://collections.comm.nsdlib.org/cgi-in/wiki.pl?BuildingCollections
  Checklist, tools and examples are provided for those wanting to contribute to build NSDL collection, but it is useful also to others.

RLG (Research Libraries Group)

- *RLG Guidelines for Microfilming to Support Digitization* (February 2003)
  Available formats: HTML
  http://www.rlg.org/preserv/

Offers supporting materials to institutions in their efforts to preserve and improve access to endangered research materials.

- *RLG Tools for Digital Imaging* (May 2002)
  Available formats: HTML
  http://www.rlg.org/preserv/RLGtools.html
  The tools include worksheets and guidelines for creating digital imaging services. The following documents are available:
  - The RLG Worksheet for Estimating Digital Reformatting Costs
  - The RLG Guidelines for Creating a Request for Proposal for Digital Imaging Services
  - The RLG Model Request for Information (RFI)
  - The RLG Model Request for Proposals (RFP)

  Reference: Papers given at the RLG and NPO Preservation Conference *Guidelines for Digital Imaging* (1998): http://www.rlg.org/preserv/joint/

- *RLG Preserving digital information* (August 2002)
  Available formats: HTML; PDF
  http://www.rlg.org/ArchTF/
  The Commission on Preservation and Access (CPA) and RLG formed the Task Force on Archiving of Digital Information, charged with investigating and recommending means to ensure "continued access indefinitely into the future of records stored in digital electronic form". The report is an outcomes of the Task Force

- Anne R. Kenny - Oya Y. Rieger. *RLG Moving theory into practice* (May 2001)
  Available formats: HTML; print publication
  http://www.rlg.org/preserv/mtip2000.html
  The book advocates an integrated approach to digital imaging programs, from selection to access to preservation, with a heavy emphasis on the intersection of institutional, cultural objectives and practical digital applications.

TASI (Technical Advisory Service for Images)

- *Managing Digitization Projects* (2002)
  Available formats: HTML; printed pack
  http://www.tasi.ac.uk/advice/managing/jidi_workflow.html
  Funded by the Joint Information Systems Committee (UK), provides information on creating, storing, and delivering digital image collections. The course includes:
  - Deciding to digitise,
  - Managing the workflow,
  - Managing the project,
  - Looking after copyright, IPR, ethics and data protection,
  - Project Management,
  - Workflow guidelines,
  - Why "Archive Standard"?,
  - Copyright,
  - Coping with copyright,
  - Quick reference copyright guide,
  - Example Licence agreement,

- JIDI digitization model,
- Lessons learned from the JIDI project,
- Risk Assessment,
- Staff Training.

Also lists events and information resources of interest to those involved in digital imaging initiatives.

TEI (Text Encoding Initiative)

- C.M. Sperberg-Mc Queen - Lou Bernard. *Guidelines for Electronic Text Encoding and*
  Interchange (March 2002 - P4 Edition)
  Available formats: XML
  http://www.tei-c.org/P4X/
  A new and corrected version of the TEI Guidelines, XML-compatible, edited by theTEI Consortium (The Association for Computers and the Humanities (ACH); The Association for Computational Linguistics (ACL); The Association for Literary and Linguistic Computing (ALLC). The Guidelines provide means of representing those features of a text which need to be identified explicitly, in order to facilitate processing of the text by computer programs. In particular, they specify a set of markers (or tags) which may be inserted in the electronic representation of the text, in order to mark the text structure and other textual features of interest.

UNESCO/ICA/IFLA

- *Guidelines for digitization projects for collection and holdings in the public domain, particularly those held by libraries and archives* (March 2002)
  Available formats: PDF
  http://www.ifla.org/VII/s19/pubs/digit-guide.pdf
  Guidelines for digitalisation projects including planning and setting up projects, selection, management and production processes. They deal with paper material, manuscripts, printed books and photograps. They are not concerned with digitization programs as an integral part of an institution strategy. They include checklists for each chapter.

University of California Los Angeles UCLA

- Kim Thompson. *Digital projects Guidelines and Standard* (1998)
  Available formats: HTML
  http://www.library.ucsb.edu/ucpag/digselec.html
  The list of criteria is recommended to guide collection development librarians and preservation librarians in selecting collections of analog materials (including paper, film, audio, and video) for conversion to digital format. Some of the criteria are based on conventional selection and preservation considerations common to all formats; others arise from the opportunities and constraints unique to digital technologies.

University of Virginia Library. Electronic Text Center

- *Archival Digital Image Creation* (1996-1997)
  Available formats: HTML

http://etext.lib.virginia.edu/helpsheets/scanimage.html

Basic Helpsheets for helping to making decisions. They include:

- Text Scanning: A Basic Helpsheet,
- Image Scanning: A Basic Helpsheet ,

The Special Collections Department.

4 On line instruments for the nomination of good practices and competence centres

All the results of WP6 are based on dynamic information.
For this reason, in parallel to the Good Practice Handbook, a set of specific on line information has been designed to complete and complement the information provided through the Handbook.

The first component of these on line information is the selected list of Digitisation Guidelines, which has been presented in the previous section.

Two additional tools have been implemented and are available on line, namely:

- The form for the nomination of good practices

- The form for the nomination of competence centers.

Concerning the good practices, at the Alicante Workshop on digitisation good practice (May 2002), with the support of the Spanish Presidency and Minerva, 42 examples have been collected by the National Representatives Group.
These examples have represented the basis for the development of the Good Practices Handbook and have been eventually made available on line within the Minerva web site[2].
However, this list cannot be in any case considered as a static list, because new examples are continuously discovered by the Minerva partners.
For this reason, a form[3] has been designed and published on the Minerva web site, to collect new examples.
Any institution who thinks that it has developed a good practise in one of the relevant areas of nomination[4], can send to Minerva[5] the form with all the concerned information.
These examples are further submitted to the respective National Representative who is ultimately responsible for the nomination.
As soon as the assessment of the good practice is confirmed by the National Representative, the example is added to the on line list.
If the example of the good practice is directly signalled by the National Representative, as soon as the Minerva web master receives the Good Practice Form properly filled, the reference is immediately published on the web.

Concerning the competence centres, a first collection has been realised in the frame of the publication of the *Progress Report of the National Representatives Group: coordination mechanisms for digitisation policies and programmes 2002*

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[2] For a complete list of the examples of good practices, please refer to Appendix 2: Good Practices in digitisation

[3] The model of the form is provided in Appendix 2: Good Practices in digitisation

[4] The list of areas of nomination are:
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

[5] The form can be e-mailed or sent by fax.

The factual information provided in the Report have been analysed and it has been found that advisory centres and associated practical competence in different areas of digitisation exist in a number of Member States and these are often producers of guidelines. Such sources of expertise are highly specialised but fragmented. It should also be noted that in most cases the result depends on bottom-up approaches and hands-on experience gained by the institutions themselves, which are further specific to particular sectors or source material types.

The list of competence centres extracted by the Report has been published on line, divided by country.
As for the case of the good practices, also in the case of the competence centres, this list cannot be considered to be a static list, because new centres are continuously discovered by the Minerva partners.
For this reason, a form[6] has been designed and published on the Minerva web site, to collect the information about new competence centres.
Any institution who thinks that it represents a competence centre, can send to Minerva[7] the form with all the concerned information.
The new competence centres are further submitted to the respective National Representative who is ultimately responsible for the nomination.
As soon as the assessment of the competence centre is confirmed by the National Representative, the centre is added to the on line list.
If the competence centre is directly signalled by the National Representative, as soon as the Minerva web master receives the Competence Centre Form properly filled, the reference is immediately published on the web.

6 The model of the form is provided in
Appendix 3: Competence centers for Digitisation
7 The form can be e-mailed or sent by fax.

5 A model of the Minerva Knowledge Base

A part of the work of WP6, the working group has developed a model of the Minerva Knowledge Base, which has been used as the first step for the integration of and improvement of access to the information gathered and published by the Minerva web site.

A meeting has been held in Rome on the 5th of May 2003 to assess the feasibility study developed by WP6 and to kick-off the technical development of the Minerva database as well as the improvement of the Minerva web site as such.

The tangible results of this work are now available on line within the Minerva web site. A prototype of the database has been published in October 2003 on the reserved area of the web site, to be checked and commented by the partners. The technical development of the database is still in progress.

The structure of the Knowledge Base has been presented at the last NRG meeting in Parma in November 2003, and it has been decided to go ahead with the implementation of the database.

The Knowledge Base is an important component for the achievement of the results expected by WP6 and it is a fundamental complement to the Good Practice Handbook described in the previous sections.
This is the reason of the strong emphasis that has been put in the design and further implementation of the online tool.

The purpose of this section is to describe the results of the feasibility study conducted by WP6, for the structure of a web application that meets the conditions given in the working model described in Deliverable D6.1. The application will be referred to as "the Minerva Knowledge Base Model". The intention is that the model should be used as basic component in building up the coordinated Minerva Knowledge Base.

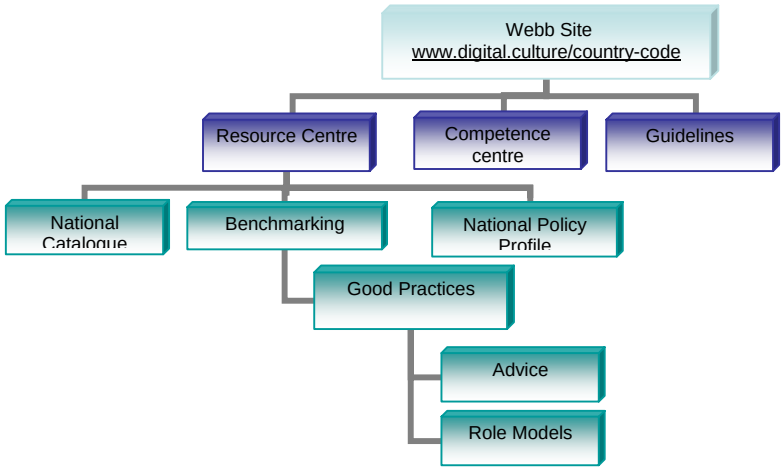

Figure 1: The working model from Deliverable D6.1

The model of the Knowledge Base is in this report limited to detailed descriptions of competence centres, good practice, guidelines, and benchmarking, in other words issues handled by WP 6.

The target group of the Minerva Knowledge Base Model are essentially bodies involved in digitisation of cultural heritage.

5.1 System development method

The construction of the web based model for the Minerva Knowledge Base was based on a development method with a strong focus on usability.[8]

The development method for the Minerva Knowledge Base Model consists of five steps: User Specification, Conceptual Design, Paper Prototyping and Construction.
One of the reasons for choosing this Method is that it provides an idea of what the model will look like at an early stage in the development process, which permits other Minerva Working Groups to take an active part in the design process[9].

5.1.1 Usability Specification

ISO, the International Standardisation Organization has used the following definition of the term "usability": "[The usability of a product is] the extent to which a product can be used by **specified users** to achieve **specified goals** with effectiveness, efficiency and satisfaction in a **specified context** of use." (ISO 9241-11)

As a consequence of this statement, the usability of a web application depends on:

- **Who** – Who are the users of the web application?
- **Where** – What does the users' working environment look like?
- **Why** – What is the reason for the user to use the web page?

The first step in the development process is to form an idea of the end users of the web page as well as the users' environment and their needs.

The output of this design phase is a document called Usability Specification and consists of different 'User Profiles'. A User Profile is a description of a typical potential system user, her or his daily environment, background and professional needs; all of which is needed to create a system that provides high usability. The User Profiles should make the end users 'come alive' to the system developers. The Usability Specification is an important tool for reaching a common understanding as to whom the web page is designed for. It should also provide useful information on system requirements to the system designers.

5.1.2 Conceptual Design

The Conceptual Design phase is the first step towards a System design: the main features of the user interface design are outlined. In this working process, the User Specification serves as a reference. The process is iterative, with continual discussions among system developers in order to get closer to final design.

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8 The Delta Method, created by Linköping University and Ericsson Infocom Consultants AB. http://www.deltamethod.net/

9 As it happened at the meeting in Rome on early May 2003.

5.1.3 Paper Prototyping

Once the general design is drawn up, the interface details will be defined in the Paper Prototyping Phase. A prototype is simplified model of a system, or parts of a system. The purpose of prototyping is to eliminate the possibilities of uncertainty and misunderstanding, to achieve unity, or to verify a solution at an early stage of design. A prototype serves as a first best guess of what the system might be. With a limited scope the prototype can be designed with less formal methods, and the costs can therefore be kept at a minimum. The prototype plays an important role in making decisions on further requirements for the system.

The purpose of designing in paper is that it allows for faster changes and at very low cost due to the non-technical interference.

5.1.4 Construction Phase

The last step after the Paper Prototyping is to produce a reliable computer/executable model, which to a large extent has the same function and performance as a real system. At this stage in the design process it will be possible to create more realistic test scenarios with the other Minerva Work Packages. The 'hi-fi' model will allow for interaction, browsing and navigation.

5.2 Results

5.2.1 User Specification

The User Specification was produced in January 2003. It was based on six interviews with people working within the Archives, Libraries and Museums domain (ALM)[10]. The Final User Profiles include descriptions of four fictional individuals working at the Project, Programme and Policy levels within the ALM sector. The User Profiles were designed to reflect potential users from all over Europe and to be used as a discussion basis concerning possible users of the Minerva Knowledge Base.

5.2.2 Conceptual Design

The starting point of the Conceptual Design Phase was the requirements derived from the User Profiles and the Model described in D6.1. To begin with, the system requirements were discussed in Work Package 6 and drafted in Paris in January 2003. The Conceptual Design was initiated in February 2003. The general ideas of the interface for the Minerva Knowledge Base Model were outlined using design software and discussed with the Minerva's Technical Working in Helsinki in February 2003. The discussion continued via email, and some of the design was partly reworked as the ideas were refined.

5.2.3 Paper Prototype

After considering the responses to the Conceptual Design by the Minerva Working Groups some additional changes were made and the Paper Prototype was completed by the end of February. The final Paper Prototype consisted of some fifty paper pages outlining the interface and system requirements of the Minerva Knowledge Base Model.

The paper prototype has been informally discussed and refined in interaction with members of the Minerva's technical working group (Work package 2-3 and 4) during February 2003.

[10] For further information on the User Profiles, please refer to
Appendix 1: Interviews for the development of the User Specifications for the Minerva Knowledge Base.

5.2.4 Construction Phase

A web based application of the Minerva Knowledge Base was developed during March 2003, which allowed for browsing, searching and entering of data (approx. 20 different views). The model consisted of a MS Access database and a script interface and was demonstrated at a dedicated meeting in Rome on May 5, 2003. The application was not designed to present a solution to interface layout. Focus was instead on the content and functions of a Knowledge Base. Decisions about the function and content are still to be made which led to a lot of assumptions during design. The Finnish benchmarking questionnaires and WP 3's work on meta data for collections was taken into consideration when designing the database. The mark-ups for the digitisation phases were taken from the WP6's good practice hand-book and are used throughout the Model for marking up the various components such as competence centres, guidelines, as well as projects, programmes and policies. These assumptions – which were necessary to accomplish the Model – can be tolerated at this stage since the Model is not intended as a final solution. Instead it is intended as a proposal and a starting point for further discussions. It will also help framing the requirements for a real system. The main features and user scenarios of the Model are outlined below.

5.3 The Minerva Knowledge Base Model

5.3.1 Content and functions

The Minerva Knowledge Base Model consists of six main areas of interest for bodies involved in digitisation[11]:

Area	Functions
National policy profile	Search
Competence centres	Search and Registration
Benchmarking	Registration and Input
Good practice database	Search and Input
Guidelines	Search
Collection catalogue/Inventories	Search

The areas of interest derive from the model in D6.1. The content and function derives from Finland's "First report on benchmarking 2002", the recommendations in D6.1 and the User Specification (Appendix 1).

The areas of interests are intended to support different users at various levels in the digitisation process. Initially the areas of interest give the users information (input) e.g. users that are searching for information on digitisation issues during a project. At a later stage users taking part in benchmarking exercises produce information (output) to the Knowledge Base e.g. a programme leader that provides the good practice database with "lessons learned" from a completed project. Hence the Knowledge Base shall support the benchmarking "wheel" where the users produce good practice which can be re-cycled in another benchmarking process.

[11] For further information about each area please refer to Deliverable 6.1

5.3.2 Different stages in the digitisation process (start-middle-end)

Areas	**1. Start**	**2. Middle**	**3. End**
	Input	Output/Input	Output
National policy profiles	X		X
Competence centres	X	X	X
Benchmarks		X	
Advice/Reports (Good Practise)	X	X	X
Role models (Good practice)	X	X	
Collection catalogue/Inventories	X	X	X

The Knowledge Base provides the user with information (input) at start. In the middle and end of the benchmarking activity the user or digitisation activity provides the Knowledge Base with new knowledge such as guidelines or good practice acquired during the benchmarking exercise.
The stages in the benchmarking process which produces good practice is demonstrated below, based on two scenarios.

1. Start of the activity

Scenario "Policy writer"
A policy writer is intending to update or create a policy. Existing policies at the European level and guidelines are consulted to provide input and an overview of the situation.

Scenario "Project leader"
A project leader is about to start a digitisation project. In order to find help, guidelines, policies and competence centres are consulted. To find inspiration and help for specific questions other projects with similar tasks and prerequisites (role models) are contacted through the good practice database. An alternative, the project leader reads the report from a similar project (advice). The project leader might find it sufficient to view the result from other collections in the catalogue.

2. Middle of the activity

Scenario "Policy writer"
The policy is nearly finished. To compare the result with other European policies the policy writer enters the policy to be benchmarked.

Scenario "Project leader"
The project has been up and running for some time. The project is entered in to the benchmarking process. As a part of the benchmarking process the project is also required to be registered as a role model in the good practice database, which allows them to be contacted by other projects in order to evaluate their project.

3. End of the activity

Scenario "Policy writer"
The policy is finished and available on the Minerva Knowledge Base

Scenario "Project leader"
The project is finished and has produced a number of advice "lessons learned" from the project. A report from the project is also available. The result of the project can be seen in the collection catalogue. In some cases long-term project might have created a competence centre

from the expertise acquired during the project or guidelines that can be used as new input into the Knowledge Base.

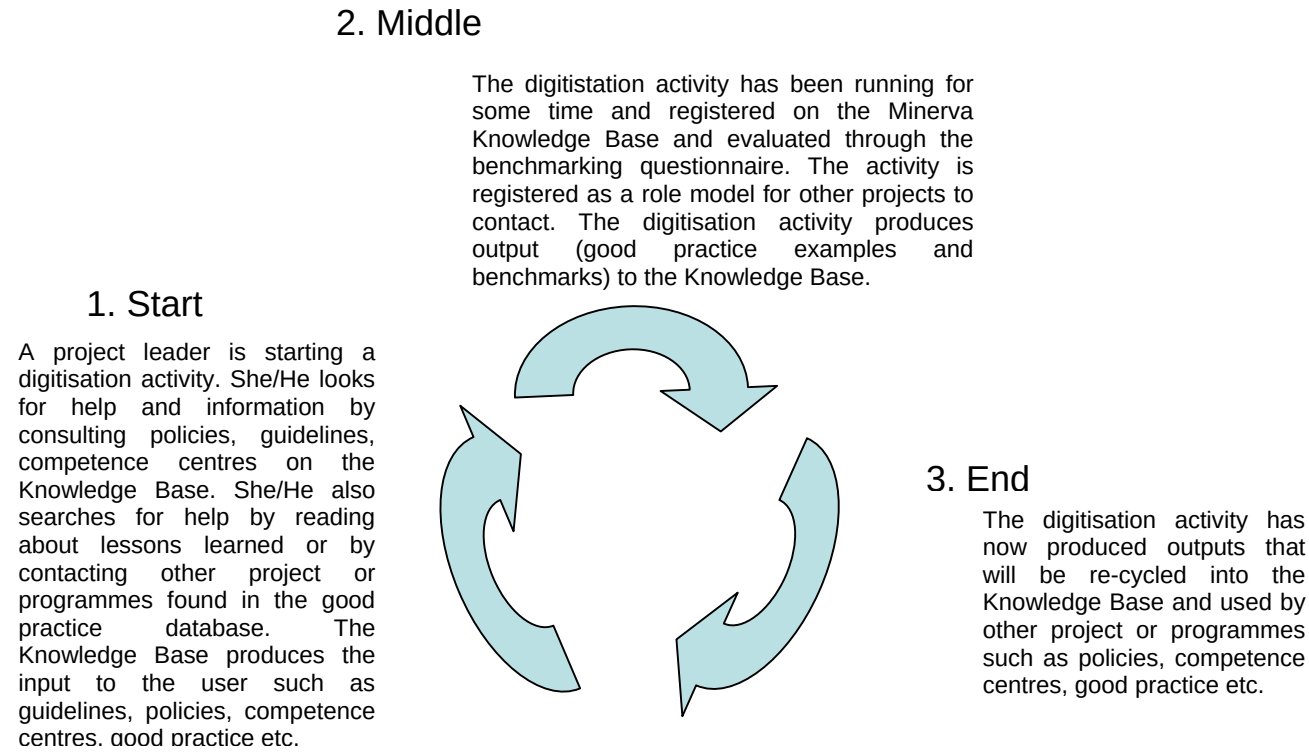

Figure2 : "The benchmarking wheel" that produces good practice

Appendix 1: Interviews for the development of the User Specifications for the Minerva Knowledge Base

The purpose of these interviews has been to document information about end users and their conditions, which were needed to start the work for the Minerva Knowledge Base from the analysis of user specifications in order to create useful web pages.

ISO, The International Standardisation Organization has used the following definition of the term "usability": "[The usability of a product is] the extent to which a product can be used by **specified users** to achieve **specified goals** with effectiveness, efficiency and satisfaction in a **specified context** of use." (ISO 9241-11)

As a consequence of this statement, the following interviews has been organised around three main questions:

- **Who** – Who are the users of the web application?
- **Where** – What does the users working environment look like?
- **Why** – What is the reason for the user to use the web page?

The information in this document is based on six interviews with people working within the archives, libraries and museums domain.

User profiles

A user profile is an abstract definition of one or more users. This will provide a background as regards their personalities (Who), user environment (Where) and the purpose of the web site (Why). Please note that the profiles described in this document are fictional and any resemblance with real persons is purely coincidental.

For the Minerva Knowledge Base Model four user profiles have been identified:

Project Level

Mr Smith, Project leader-35 years, Town archive

About Mr Smith (Who)

Mr Smith is a project manager at the Department of Historical Registrations of the City Archives. He has a mixed academic background and a great interest in cultural history. Mr Smith is also interested in computers and the technical issues that might arise a typical work day.

Mr Smith's previous working experience includes computer related training and education for adults. Today, his daily duties consist of preparing and managing digitisation projects, which includes monitoring the registration phase and addressing problems that occur during that phase.

Mr Smith is also responsible for writing project reports. Some of the projects of long duration may go on for several years while the shortest projects cover only a few months. One of the

long-term projects Mr Smith mentions covers census registers from 1869-1885. The Project will take 7-8 years to complete and involves 15 people.

One of the shorter projects deals with registration of death certificates and driver's licences.

Mr Smiths Environment (Where)

First thing in the morning Mr Smith checks his e-mail, after which he usually attends meetings until noon. In the early afternoon he is generally involved in assisting his staff with problems concerning passwords and the like or he answers various questions, for instance how to fill in a certain form. In the late afternoon he mostly writes statistics reports, dealing, for example, with the volumes that have been recorded that day. Mr Smith uses a desktop computer with a permanent internet connection (ADSL). Unfortunately, he can't access the office network from home. Mr Smith works all day long with computers and views himself as an advanced computer user.

Why does Mr Smith need the Minerva web page? (Why)

From Mr Smith's point of view his team is alone with the sort of work task they are performing and they do not have any contact with external projects. When facing problems related to SQL, databases and the ASP system, he lacks guidance and would like to be able to exchange experience with projects that have encountered similar problems. Two persons from his Unit are available to help out when problems arise; with them he discusses techniques and exchanges ideas. One of the problems according to Mr Smith is to assess the amount of time required for a given project.

Mr Smith is in favour of the idea to be able to assist other external projects with his expertise.

Mr Smith's desiderata

- Mr Smith would not mind his projects' serving as Role Model for other projects.
- Mr Smith would like to compare his projects with similar projects mostly out of curiosity
- In Mr Smith's view his projects could provide lessons learned
- Mr Smith likes the idea of a Forum for projects, where they can exchange ideas and share experiences

Mrs Müller Project leader -33 years, County Museum

About Mrs Müller (Who)

Mrs Müller has been working for several years with digitisation of Museum collections. The collections comprise both images and items. Mrs Müller has a University degree in traditional Museum science including ethnology and history. Prior to her present employment she worked in another Museum with similar tasks.

Mrs Müller's interests are mainly within the field of culture and arts she likes reading and going to the movies. In her daily work with digitisation she has become acquainted with technical issues and she gained a special proficiency in solving different kinds of technical problems. Mrs Müller has no specific education on digitisation matters – her knowledge in digitisation is based on experiences from work and some internal education that concerned registration, image handling and the Personal Data Act.

Mrs Müller's Environment (Where)

For Mrs Müller, a typical workday consists of meetings with people responsible for the various items that are being digitised. She does not spend a lot of time in the office, since she constantly moving around between the different buildings of the Museum.
Mrs Müller also deals with project administration and plans project activities. Quality assurance is an important part of the work and is very time consuming, she says. Mrs Müller believes herself to be an advanced computer user and uses the web to find information about the objects that are to be digitised. Mrs Müller does not use the web to seek help concerning digitisation matters, because she does not know where to look and how to perform the search. Mrs Müller thinks it is important to see the results of other Museums efforts. Through a big joint project between different museums, she has access to a wide network of people striving to solve the same kind of problems.

Why does Mrs Müller need the Minerva web site? (Why)

Mrs Müller's point of view is that her Network helps her to solve a lot of problems that arise during the lifecycle of a project. Still, she wouldn't mind expanding her network in order to include other project partners. She specially favours the idea of finding colleagues that work with the same software and hardware that her team does, because at the moment no other project uses the same technical environment as her project, says Mrs Müller. Before Mrs Müller got in contact with her present network, she did not have much contact with other digitisation projects.

Some of Mrs Müller's daily problems concern the financial situation, to find sponsoring for the digitisation projects. Other problems she mentions are:
The level of technical knowledge is generally low in the Museums sector, due to lack of interest and experience. Mrs Müller mentions Databases and metadata as two areas that are constantly causing problems. – People tend to have an exaggerated belief in what databases can do. There are a lot of pitfalls with grave consequences in terms of money and time that could be avoided through co-operation and mutual guidance.

Mrs Müller's desiderata

- To find digitisation partners with similar hardware and software platforms
- Financial aid (e.g. by joining the benchmarking process?)
- Brainstorming partners concerning databases and the registration of metadata

Programme Level

Mr Corelli – Programme manager -55 years

About Mr Corelli (Who)

Mr Corelli works since several years in the National Library as a librarian and Programme manager for the digitisation sector. Mr Corelli is involved with several steering committees for digitisation programmes and digitisation initiatives. Before he started working with digitisation he was a manager at the computers department at the same Library. Mr Corelli has a degree in Arts and a doctor's degree in mathematics and physics. His hobbies are book art and lithography. His work takes most of his time and he often works late in the evenings, especially on reports and bases for various decisions.

Mr Corelli's Environment (Where)

Mr Corelli's office is equipped with a broadband Internet connection. He spends a lot of time in telephone conversations and meetings.

Why does Mr Corelli need the Minerva website? (Why)

In the Library, there is a lot of technical expertise that has been accumulated over the years. A lot of time and effort is spent on extending the network. They have a long tradition of co-operation with other institutions. However, a lot of time and effort is spent on expanding and evaluating the network. Even though the library is part of extensive co-operation programs with other national institutions, there is a wish to get involved in cross-boundary activities.

In spite of many years of professional experience, some complex areas in the digitisation field still cause difficulties. One such example is terminology. – Terminology co-ordination allows people who work with digitisation, such as librarians, restorers, IT staff, photographers and the like, to understand each other better, says Mr Corelli.

Other difficult areas that he mentions are preservation, quality, colour control and long-term accessibility.

Mr Corelli can easily picture his digitisation projects as Role Models for other libraries. With more resources and proper political willingness, Mr Corelli thinks that a Competence Centre could be built in the next few years. Today, guidelines and political decisions are lacking.

Mr Corelli's desiderata

- To some extent, Mr Corelli can imagine that his digitisation projects could be nominated, by his department, as Role Models for other digitisations projects
- Mr Corelli wishes to compare his programme with other programmes
- Mr Corelli can imagine creating national guidelines on digitisation together with other national institutions
- Mr Corelli can imagine building a Competence Centre provided that a proper political decision is made

Policy Level

Mrs Charpentier, Governmental Expert -56 years

About Mrs Charpentier (Who)

Mrs Charpentier works as a digitisation expert at the Cultural Heritage Division of the Ministry of Culture. Mrs Charpentier's main responsibilities are updating the national policy profile on digitisation and allocation of funds for digitisation programmes and projects. She spends a lot of time in meetings with various cultural heritage institutions, local governments and organisations at the national level as well as the international level. She is also often involved in arranging conferences and seminars on digitisation issues.

Mrs Charpentier has an academic background in architecture. Before she joined the Ministry of Culture, she worked for several years as a project manager at the National Museum.

Mrs Charpentier's Environment (Where)

In the morning, Mrs Charpentier works in her office on her laptop computer with a broadband Internet connection; she checks her e-mail and goes through the schedule of the day with her secretary. In the afternoon, she spends a lot of time in meetings and reading reports from the cultural institutions.

Why does Mrs Charpentier need the Minerva website? (Why)

As Mrs Charpentier is highly involved with digitisation issues both at the national and international level, she needs a broad outlook over ongoing digitisation activities to carry out her regular duties. Mrs Charpentier thinks it would be interesting to be able to compare her country's policies to a European standard or to other policies. This would allow her to spot any weaknesses in her own policy. She doubts, though, it would be useful to compare projects and programmes of different countries, since focus and priorities may differ from one National Policy to another. In digitisation, people's focus tends to vary over time due to shifting trends: for example, today long-term preservation is a big issue, she says.

Mrs Charpentier is also interested in posting good practice projects on her Government web site to serve as examples for other projects.

Charpentier's desiderata

- Mrs Charpentier is interested in comparing her policy to other policies
- Mrs Charpentier needs to keep track of digitisation activities going on in the European Union
- Mrs Charpentier would like a web based tool for highlighting good practice examples for other projects, e.g. a Use Case form to be filled out by projects or programmes

Appendix 2: Good Practices in digitisation

Form for the nomination of good practices

Each project can be 'nominated' for more than one area, following your evaluation of the most important features contained in the example.
AREAS for nominations of 'good practice' for on-going projects on digitisation:

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

For each project please specify:

- Area of 'good practice' where you like to nominate your project (you can put more than only one area):
- Name:
- Responsible body and/or any specific Co-ordinating body/mechanism:
- Contact person:
- Web site:
- Description of the project, objectives and priorities:
- The main technical features for what you consider the project a 'good practice' example:
- Long term sustainability strategy:
- Accessibility by users via local network or Internet (describe modalities and IPR issue from a technical point of view):
- Problems encountered :

Comments:
Figures and documents enclosed:
I agree this information could be published: Yes No

ORGANISATION & PERSON COMPLETING THE QUESTIONNAIRE
· Formal name of organisation:
· Type of organisation:
· Field of action: Archive / Library / Museum / Foundation / others ….
· Address:
· Name of director:
· Name and role of person completing the questionnaire:
· Tel:
· Fax:
· Web site:
· E-mail:
Date:

List of good practices

1. Preservation of physical objects via digitisation and electronic surrogates

- **Austria**
  - Digital Image Archive (Austrian National Library) http://www.bildarchiv.at
    [ALICANTE FORM RTF 6.667KB]

- **Finland**
  - Digital historical newspaper Library 1771-1860(ready), continuing to 1890 (National Library) http://digi.lib.helsinki.fi
    [ALICANTE FORM RTF 32KB]
  - The Nordic library
    http://tiden.kb.se
    [ALICANTE FORM RTF 56KB]

- **Germany**
  - Digital Conversion Forms (Landesarchivdirektion Baden-Württemberg)
    http://www.lad-bw.de
    [ALICANTE FORM RTF 35KB]

- **Greece**
  - ODYSSEUS (HPCLAB, High Performance Information Systems Laboratory, University of Patras) http://www.culture.gr
    [ALICANTE FORM RTF 54KB]

- **Italy**
  - DADDI (Galleria degli Uffizi e Soprintendenza Speciale per il Polo Museale Fiorentino)
    http://www.uffizi.firenze.it/dta/daddi-eng.html
    [ALICANTE FORM RTF 32KB]
  - Diplomatico (Archivio di Stato di Firenze)
    http://www.archiviodistato.firenze.it/progetti/attivite.htm
    [ALICANTE FORM RTF 39KB]
  - Mediceo avanti il Principato on line (Archivio di Stato di Firenze)
    http://www.archiviodistato.firenze.it/Map/
    [ALICANTE FORM RTF 33KB]
  - RV - Rinascimento Virtuale-Digitalepalimpsest Forschung (ICCU, Istituto Centrale per il Catalogo Unico delle biblioteche italiane e per le informazioni bibliografiche (http://www.iccu.sbn.it) ; Biblioteca Medicea Laurenziana, Firenze (http://www.bml.firenze.sbn.it))
    [ALICANTE FORM RTF 36KB]

- S.I.T.I.A. - Sistema Informativo Territoriale Integrato per l'Archeologia (Direzione Generale per I Beni Archeologici) (http://www.archeologia.beniculturali.it)
  [ALICANTE FORM RTF 44KB]

- Virtual Archaeological Tours around the Lost Cities (Direzione Generale per I Beni Archeologici) (http://www.archeologia.beniculturali.it)
  [ALICANTE FORM RTF 46KB]

o **Spain**

- Aer - Archivos Estatales en red Ubdirección General de Archivos Estatales; (Ministerio de Educación, Cultura y Deporte)
  http://www.mcu.es/lab/archivos/aer/index.html
  [ALICANTE FORM RTF 33KB]

- Virtual Sites Recreation (Consejo de Administración de Patrimonio Nacional)
  http://www.patrimonionacional.es
  [ALICANTE FORM RTF 35KB]

2. High quality of the digitisation process

o **Germany**

- Digital Conversion Forms (Landesarchivdirektion Baden-Württemberg)
  http://www.lad-bw.de
  [ALICANTE FORM RTF 35KB]

- Workflow and tools for providing access to larger quantities of archival material (Landesarchivdirektion Baden-Württemberg)
  http://www.lad-bw.de
  [ALICANTE FORM RTF 36KB]

o **Greece**

- ODYSSEUS (HPCLAB, High Performance Information Systems Laboratory, University of Patras) http://www.culture.gr
  [ALICANTE FORM RTF 54KB]

o **Italy**

- DADDI (Galleria degli Uffizi e Soprintendenza Speciale per il Polo Museale Fiorentino)
  http://www.uffizi.firenze.it/Dta/daddi-eng.html
  [ALICANTE FORM RTF 32KB]

- Information Network (ICCD, Istituto Centrale per il Catalogo e la Documentazione)
  http://www.iccd.beniculturali.it
  [ALICANTE FORM RTF 35KB]

- RV - Rinascimento Virtuale- Digitalepalimpsest Forschung (ICCU, Istituto Centrale per il Catalogo Unico delle biblioteche italiane e per le informazioni bibliografiche (http://www.iccu.sbn.it); Biblioteca Medicea Laurenziana, Firenze (http://www.bml.firenze.sbn.it))
  [ALICANTE FORM RTF 36KB]

- Virtual Archaeological Tours around the Lost Cities (Direzione Generale per I Beni Archeologici)
  http://www.archeologia.beniculturali.it
  [ALICANTE FORM RTF 46KB]

o **Portugal**
- MatrizNet (IPM, Instituto Português de Museus)
  http://www.matriznet.ipmuseus.pt
  [ALICANTE FORM RTF 37KB]

o **Spain**
- Biblioteca Virtual Miguel de Cervantes (Miguel de Cervantes Digital Library)
  http://cervantesvirtual.com/
  [ALICANTE FORM RTF 49KB]

- Virtual Sites Recreation (Consejo de Administración de Patrimonio Nacional)
  http://www.patrimonionacional.es
  [ALICANTE FORM RTF 35KB]

o **United Kingdom**
- The British Museum COMPASS project
  http://www.thebritishmuseum.ac.uk/compass
  [ALICANTE FORM RTF 37KB]

3. Metadata and thesaurus

o **Austria**
- Metadata Engine (University of Innsbruck)
  http://meta-e.uibk.ac.at/
  [ALICANTE FORM RTF 32KB]

o **France**
- Audio-Visual Heritage Plan in France (INA digitisation programme of National Audio-Visual Archives)
  http://www.ina.fr/index.en.html
  [ALICANTE FORM RTF 34KB]

- National digitisation programme - annual project calls (Ministère de la Culture et de la Communication - Mission de la Recherche et de la Technologie)
  http://www.culture.gouv.fr/culture/mrt/numerisation/index.htm
  [ALICANTE FORM RTF 61KB]

o **Germany**

- Common Internet Portal for Libraries, Archives and Museums (BAM portal) (Landesarchivdirektion Baden-Württemberg)
  http://www.bam-portal.de/
  [ALICANTE FORM RTF 35KB]

o **Italy**

- ICONCLASS in Italian (ICCD, Istituto Centrale per il Catalogo e la Documentazione; Ministero per i Beni e le Attività Culturali)
  http://www.iccd.beniculturali.it
  [ALICANTE FORM RTF 31KB]

- RV - Rinascimento Virtuale- Digitalepalimpsest Forschung (ICCU, Istituto Centrale per il Catalogo Unico delle biblioteche italiane e per le informazioni bibliografiche (http://www.iccu.sbn.it); Biblioteca Medicea Laurenziana, Firenze (http://www.bml.firenze.sbn.it))
  [ALICANTE FORM RTF 36KB]

- S.I.T.I.A - Sistema Informativo Territoriale Integrato per l'Archeologia (Direzione Generale per i Beni Archeologici)
  http://www.archeologia.beniculturali.it
  [ALICANTE FORM RTF 44KB]

o **Portugal**

- Endovellicus System (Portuguese Institute of Archaeology)
  http://www.ipa.min-cultura.pt
  [ALICANTE FORM RTF 41KB]

4. Usability of project results

o **Denmark**

- "The soldier in the Backyard - an interactive children´s story on the Internet" (CultureNet Denmark)
  http://www.soldatenibaghaven.dk
  [ALICANTE FORM RTF 46KB]

o

France

- Audio-Visual Heritage Plan in France (INA digitisation programme of National Audio-Visual Archives)
  http://www.ina.fr/index.en.html
  [ALICANTE FORM RTF 34KB]

- National digitisation programme - annual project calls (Ministère de la Culture et de la Communication - Mission de la Recherche et de la Technologie)
  http://www.culture.gouv.fr/culture/mrt/numerisation/index.htm
  [ALICANTE FORM RTF 61KB]

o **Ireland**

- ACTIVATE (An Chomhairle Leabharlanna/The Library Council)
  http://www.activate.ie
  http://www.activate.ie/sites/scatteryVR
  [ALICANTE FORM RTF 50KB]

o **Italy**

- "I dipinti della Galleria Spada" (Istituto Centrale per il Catalogo e la Documentazione - Ministero per i Beni e le Attività Culturali)
  http://www.iccd.beniculturali.it
  [ALICANTE FORM RTF 30KB]

- Edit16 (ICCU Istituto Centrale per il Catalogo Unico delle biblioteche italiane e per le informazioni bibliografiche)
  http://edit16.iccu.sbn.it
  [ALICANTE FORM RTF 31KB]

- "Le piazze storiche" (ICCD, Istituto Centrale per il Catalogo e la Documentazione)
  http://cantieri.theranet.it/piazze
  [ALICANTE FORM RTF 30KB]

- RV - Rinascimento Virtuale- Digitalepalimpsest Forschung (ICCU, Istituto Centrale per il Catalogo Unico delle biblioteche italiane e per le informazioni bibliografiche (http://www.iccu.sbn.it); Biblioteca Medicea Laurenziana, Firenze (http://www.bml.firenze.sbn.it))
  [ALICANTE FORM RTF 36KB]

- SBNonline (ICCU, Istituto Centrale per il Catalogo Unico delle biblioteche italiane e per le informazioni bibliografiche)
  http://sbnonline.sbn.it
  [ALICANTE FORM RTF 31KB]

- TRADEX - TRial Action for Digital object Exhange IST 1999 21031 (Multimedia and Telematic Research Centre of Consorzio Pisa Ricerche, (IT); ICCD, Istituto Centrale per il Catalogo e la Documentazione)
  http://www.tradex-ist.com
  [ALICANTE FORM RTF 36KB]

o

Spain

- Biblioteca Virtual Miguel de Cervantes (Miguel de Cervantes Digital Library)
  http://cervantesvirtual.com/
  [ALICANTE FORM RTF 49KB]

o **Sweden**

- The Oxenstierna Project. The Works and Correspondence of Axel Oxenstierna, Chancellor of Sweden 1612 - 1654 (National Archives of Sweden)
  http://www.ra.se/ra/Oxenstierna/oxenstierna1.html
  [ALICANTE FORM RTF 36KB]

5. Management of the process and workflow

o **Denmark**

- "The soldier in the Backyard - an interactive children´s story on the Internet" (CultureNet Denmark)
  http://www.soldatenibaghaven.dk
  [ALICANTE FORM RTF 46KB]

o **Finland**

- Digital historical newspaper Library 1771-1860 (ready), continuing to 1890 (National Library)
  http://digi.lib.helsinki.fi
  [ALICANTE FORM RTF 32KB]

- The Nordic library
  http://tiden.kb.se
  [ALICANTE FORM RTF 56KB]

o **France**

- Audio-Visual Heritage Plan in France (INA digitisation programme of National Audio-Visual Archives)
  http://www.ina.fr/index.en.html
  [ALICANTE FORM RTF 34KB]

- National digitisation programme - annual project calls (Ministère de la Culture et de la Communication - Mission de la Recherche et de la Technologie)
  http://www.culture.gouv.fr/culture/mrt/numerisation/index.htm
  [ALICANTE FORM RTF 61KB]

o **Germany**

- Workflow and tools for providing access to larger quantities of archival material (Landesarchivdirektion Baden-Württemberg)
  http://www.lad-bw.de
  [ALICANTE FORM RTF 36KB]

o

Spain

- Biblioteca Virtual Miguel de Cervantes (Miguel de Cervantes Digital Library)
  http://cervantesvirtual.com/
  [ALICANTE FORM RTF 49KB]

6. Accessibility including copyright issues and web sites

o **Denmark**

- Kongens Kunstkammer, Royal Chamber of Art. (National Museum of Denmark)
  http://www.kunstkammer.dk
  [ALICANTE FORM RTF 33KB]

o **Germany**

- Common Internet Portal for Libraries, Archives and Museums (BAM portal) (Landesarchivdirektion Baden-Württemberg)
  http://www.bam-portal.de/
  [ALICANTE FORM RTF 61KB]

o **Greece**

- ODYSSEUS (HPCLAB, High Performance Information Systems Laboratory, University of Patras)
  http://www.culture.gr
  [ALICANTE FORM RTF 54KB]

o **Ireland**

- ACTIVATE (An Chomhairle Leabharlanna/The Library Council)
  http://www.activate.ie
  http://www.activate.ie/sites/scatteryVR
  [ALICANTE FORM RTF 50KB]

o **Italy**

- DADDI (Galleria degli Uffizi e Soprintendenza Speciale per il Polo Museale Fiorentino)
  http://www.uffizi.firenze.it/Dta/daddi-eng.html
  [ALICANTE FORM RTF 32KB]

- Diplomatico (Archivio di Stato di Firenze)
  [ALICANTE FORM RTF 39KB]

- Edit16 (ICCU Istituto Centrale per il Catalogo Unico delle biblioteche italiane e per le informazioni bibliografiche)
  http://edit16.iccu.sbn.it
  [ALICANTE FORM RTF 31KB]

- Mediceo avanti il Principato on line (Archivio di Stato di Firenze)
  http://www.archiviodistato.firenze.it/Map/
  [ALICANTE FORM RTF 33KB]

- SBNonline (ICCU, Istituto Centrale per il Catalogo Unico delle biblioteche italiane e per le informazioni bibliografiche - Central Institute for Union Catalogne)
  http://sbnonline.sbn.it
  [ALICANTE FORM RTF 31KB]

- Museo Nazionale d´Abruzzo (Soprintendenza per i beni Storici Artistici ed Antropologici; Museo Nazionale d'Abruzzo)
  http://www.muvi.org/museonazionaledabruzzo
  [ALICANTE FORM RTF 58KB]

- Soprintendenza per i beni Storici Artistici ed Antropologici di Bologna
  http://www.pinacotecabologna.it
  [ALICANTE FORM RTF 58KB]

- Galleria Estense (Soprintendenza per i beni Storici Artistici ed Archeologici di Modena e Reggio Emilia)
  http://www.galleria.estense.it
  [ALICANTE FORM RTF 58KB]

- TRADEX - TRial Action for Digital object Exhange IST 1999 21031 (Multimedia and Telematic Research Centre of Consorzio Pisa Ricerche, (IT); ICCD, Istituto Centrale per il Catalogo e la Documentazione)
  http://www.tradex-ist.com
  [ALICANTE FORM RTF 36KB]

o **Spain**

- Aer - Archivos Estatales en red (Ubdirección General de Archivos Estatales; Ministerio de Educación, Cultura y Deporte)
  http://www.mcu.es/lab/archivos/aer/index.html
  [ALICANTE FORM RTF 33KB]

- Biblioteca Virtual Miguel de Cervantes (Miguel de Cervantes Digital Library)
  http://cervantesvirtual.com/
  [ALICANTE FORM RTF 49KB]

o **United Kingdom**

- The British Museum COMPASS project
  http://www.thebritishmuseum.ac.uk/compass
  [ALICANTE FORM RTF 37KB]

Appendix 3: Competence centers for Digitisation

Form for the nomination of Competence Centres

Each competence centre can be "nominated" for more areas.
AEAS for nominations of "**competence centre**":

- Consulting, collection management, metadata ontology
- Digitisation of art objects
- Digitisation of books
- Digitisation of film
- Digitisation of manuscripts
- Digitisation of museum collections
- Digitisation of newspapers
- Digitisation of photographic objects
- Digitisation of public archives
- Digitisation of sound
- Digitisation of TV and radio
- Multimedia
- 3D-environment
- Virtual exhibitions
- Other _____ (please, specify)

Please specify:

Area for nomination of "**competence centre**" where you like to nominate your institution (you can put more than only one area)

Institution Name:_____

Responsible body:_____

Address:_____

Country:_____

Tel.:_____

Fax :_____

Web site:_____

Contact Person:_____

E-mail:_____

Contact Language:

Description (Short description of what the competence centre does)

List of Competence Centres

Austria

- Albertina
  http://www.albertina.at/
  Digitisation of objects

- CSC Austria, Cultural Service Centre Austria
  http://www.cscaustria.at/index.php
  Consulting, collection management, metadata ontology

- Kunsthistorisches Museum
  http://www.khm.at/
  Digitisation of art objects

- Österreichische Mediathek
  http://www.mediathek.ac.at/_startseite/start.html
  Digitisation of sound

- Österreichische Nationalbibliothek
  http://www.onb.ac.at/
  Digitisation of photographic objects, digitisation of newspapers

- Salzburg Research
  http://www.salzburgresearch.at/
  Multimedia, knowledge management

- Technisches Museum
  http://www.tmw.ac.at
  Virtual exhibitions, 3D-environment

- Universitätsbibliothek Graz
  http://www.kfunigraz.ac.at/ub/
  Digitisation of manuscripts

- Universität Innsbruck
  http://www.uibk.ac.at/index-en.html
  Digitisation of books, metadata

Belgium

- **Flemish Community**
  - CultuurNet Vlaanderen - CultureNet Flanders
    http://www.cultuurnet.be/showpage.asp?iPageID=2
    CultureNet Flanders wishes to collect, develop, re-distribute and share existing knowledge and experience around cultural communication. The Culture database project aims to establish a crossroads database in a network of databases. The central core will become an open technical platform, within which all basic information on the cultural offer in Flanders is stored and exchanged (digitised), with countless other large and small databases.

- Maerlant Centrum - Maerlant Center
  http://www.maerlant.be
  Founded in 1999 and based at the University of Leuven, Maerlant Center boasts expertise in web publishing, digitization, digital publication of historical sources for scientific and educational purposes, trans-European collaboration, and designing systems for Open and Distance Learning in universities

- Vlaams Centrum voor Openbare Bibliotheken = Flemish Centre for Public libraries
  http://www.vcob.be
  VCOB develops specific competence in the application of standards for data description = (meta) data description standards. And later on for searches: search and retrieval standards; integration of services in a network context: service provisioning in a network.

o **French Community**
  - MUNDANEUM
    http://www.mundaneum.be
    Centre for private archives of the French Community of Belgium

Denmark

o The Centre for Internet Research
  http://imv.au.dk/cfi/eng/index_eng.html
  Preservation of digital content

o Culturenet Denmark
  http://www.kulturnet.dk/en/text/
  Presentation/dissemination/communication of web content

o Danish Film Institute
  http://www.dfi.dk/sitemod/moduler/forside/index.asp?pid=0
  Digitisation of film

o Danish National library Authority
  http://www.bs.dk/index.ihtml
  Digitisation for research libraries and IPR

o National Cultural Heritage Agency
  http://www.kuas.dk
  Databases and cultural heritage inventories

o The National Museum
  http://www.natmus.dk/
  Virtual Museum

o Public Broadcasting Association
  http://www.dr.dk/
  Digitisation of TV and Radio

o The Royal library
  http://www.kb.dk/
  Extensive digitisation of written material

- The State Archives
  http://www.sa.dk
  Public archive digitisation

- State Museum for Art
  http://www.smk.dk/smk.nsf/docs/splash
  Virtual museum

- The State library
  http://www.statsbiblioteket.dk/
  Digitisation of sound

- TV2
  http://tv2.dk/
  Digitisation of TV and radio

Finland

- Finnish Museum of Photography
  http://www.fmp.fi/fmp_fi/muvieras/english/general.htm
  Digitisation of photographs

- Finnish National Gallery
  http://www.fng.fi/fng/rootnew/en/vtm/etusivu.htm
  Digitisation of art objects

- Centre for Microfilming and Conservation, Helsinki University library
  http://www.helsinki.fi/~mtenkane/eng/
  Digitisation of printed material and preservation of Web content

- National Board of Antiquities, Knowledge Management Centre
  http://www.nba.fi/Home.htm
  Databases and cultural heritage inventories

- National Archivesz
  http://www.narc.fi
  Digitisation of archival material, long-term preservation of digital material

- The Finnish Film Archive
  http://www.sea.fi/english/
  Preservation of recorded sound and moving images and databases on these items

France

- Modelling, simulations for architecture, urbanism and landscapes (MAP)
  http://www.map.archi.fr/
  Research centre, national scope, 3D modelling for monuments and natural sites

- National Audiovisual Institute) for sound and audiovisual documents (INA)
  http://www.france.diplomatie.fr/label_france/ENGliSH/COM/INA/ina.html
  Research and preservation and management of audiovisual archives

- National library of France for printed matter, music and sound (IRCAM)
  http://www.ircam.fr/index-e.html
  Institut Recherche et Coordination Acoustique / Musique

- C2RMF for databases and tools for processing images for the conservation or restoration of heritage
  http://www.c2rmf.fr/
  3D objects and 2D very high quality digitisation, multilingualism

Ireland

- An Chomhairle Leabharlanna / The Library Council
  http://www.librarycouncil.ie
  Digitisation of printed text, images, manuscript, archive, a/v & 3-D material

- The National Library of Ireland
  http://www.nli.ie
  Digitisation of printed text, manuscript, images

- Radio Telifís Éireann (RTÉ) Irish National Public Service Broadcasting Station
  http://www.rte.ie
  Digitisation of audio and video

- The University of Dublin, Trinity College
  http://www.tcd.ie
  Digitisation of printed text, manuscript, images

Italy

- Istituto Centrale per il Catalogo e la Documentazione (ICCD) = Central Institute for Cataloguing and Documentation
  http://www.iccd.beniculturali.it
  Programming, planning and defining standards in the field of cataloguing the Italian cultural heritage, in particular digitisation

- Istituto Centrale per il Catalogo Unico delle Biblioteche Italiane e per le Informazioni Bibliografiche (ICCU) = Central Institute for the Union Catalogue of Italian libraries and Bibliographic Information
  http://www.iccu.sbn.it
  The body responsible for cataloguing the book heritage and at the moment is the most developed sector in the field of digitisation

- Istituto Centrale per il Restauro (ICR) = Central Institute for Restoration
  http://www.icr.beniculturali.it
  The body responsible for all activities of restoration in Italy

- Istituto Centrale per la Patologia del libro (ICPL) = Central Institute of Book Pathology
  http://www.librari.beniculturali.it/struttura/default.asp
  It contributes to define methodologies, and plays an intensive role in solving conservation problems arising in Italian libraries. Specific teams are at work both for the evaluation of perspectives in digital media preservation, and for the digitisation of the information on book conservation

Netherlands - DEN

- Netherlands Institute for Cultural Heritage - ICN
  http://www.icn.nl
  Digitisation of museum collections

- Netherlands Institute for Art History - RKD
  http://www.rkd.nl
  Digitisation of museum collections

- Netherlands Institute for Image and Sound - NIBG
  http://www.nibg.nl
  Digitisation of audio-visual heritage

- Koninklijke Bibliotheek - KB
  http://www.kb.nl
  Digitisation of library collections long term preservation, storage of websites

- Netherlands Association of Public libraries - NBLC
  http://www.nblc.nl
  Accesability of public library records and information

- Netherlands Dept. for Conservation - RdMz
  http://www.monumentenzorg.nl
  Digitisation of information on built & archeological monuments

- National Service for Archeological Research - ROB
  http://www.archis.nl
  Digitisation of information on built & archeological monuments

- Netherlands Association for Digital Heritage - DEN
  http://www.den.nl
  Digitisation of heritage in general, programming and defining standards

- National Archives - NA
  http://www.nationaalarchief.nl
  Digitisation of archival records, records management, long term preservation

Sweden

- Kunkliga Biblioteket Sveriges = Royal library of Sweden
  http://www.kb.se
  Digitisation of printed material and preservation of Web content

- Lantmäteriet = Swedish Land Survey Authority
  http://www.lantmateriet.se/index_eng.htm
  Digitisation and preservation of maps on the Web

- Riksarkivet = National Archives
  http://www.ra.se
  Digitisation of archival material, long-term preservation of archival material in digital form,
  and databases on archival content

- Riksantikvarieämbetet = National Heritage Board
  http://www.raa.se
  Databases on cultural heritage

- Statens ljud- och bildarkiv = The National Archives of Recorded Sound and Moving Images
  http://www.ljudochbildarkivet.se
  Preservation of recorded sound and moving images and databases on these items

United Kingdom

- UKOLN
  http://www.ukoln.ac.uk
  Interoperability and technical standards

- Higher Education Digitisation Service
  http://www.heds.herts.ac.uk
  Digitisation and workflow management

- Technical Advisory Service for Images
  http://www.tasi.ac.uk
  Image capture

- Arts & Humanities Data Service
  http://ahds.ac.uk
  Data archiving and presentation

- Archaeology Data Service
  http://ads.ahds.ac.uk
  Implementation of interoperability, and metadata

- The Humanities Advanced Technology and Information Institute
  http://www.hatii.arts.gla.ac.uk/
  Management of digitisation projects