Digitisation of a Museum Collection - Final Report

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Introduction

This is the fifth and final report compiled as a result of Waterford Museum Treasures's participation in the Cultural Heritage Project, a national digitisation pilot project, managed by An Chomhairle Leabharlanna/The Library Council, the aims of which include

- the development of published guidelines & methodologies for digitisation and web publication and the establishment of centres of expertise.
- the creation of online access to the national cultural heritage.

The importance of the project lies in the experience and expertise gained, in a context where there are no published standardardised guidelines and methodologies for digitisation in the cultural area (while many digitisation initiatives are taking place). The outcomes of the project (askaboutireland.com and the Reports) should help enormously with the establishment of such.

The previous 4 reports provide a logical sequence of the conduct of a digitisation project (while not exactly a linear process). Report 1 set the scene. Report 2 presented a sample digitisation plan; Report 3 reported on the implementation of that plan and dealt with the issue of copyright. Report 4 dealt with the future preservation and management of the digital resource to maximise the return on the investment and to that end, dealt with issues of metadata, markup language, tagging.

Objectives of this report

- To summarise the previous Reports, distil them into the absolute essentials
- To reiterate the main points of a digitisation project and the specific tasks of this project
- To summarise the issue of 3D
- To evaluate the project of Waterford Museum of Treasures – what has been achieved? what lessons were learned?
- Out of the last, general conclusions and recommendations for future digitisation projects
- To list the references and resources used in this project

Summary of Report 1
Digitisation of a Museum Collection – towards a project framework & the technical requirements

This report covered the approach of Waterford Museum of Treasures to the digitisation project. There will always be a research phase which will vary in length depending on the level of experience of the staff involved, to get an overview of the range and scope of what has been achieved in digitising cultural content. This serves several purposes including familiarisation with terminology, scope and issues of digitsation and it gives some templates for what an organisation has done – "I like that site, I'd like to do something like that". At Waterford Museum of Treasures there was extensive desk research of the entire area of digitisation and of what has been achieved specifically by museums and of how they present themselves on the www (including searchable catalogues online).

Towards a project framework -

Digitisation was defined as the creation of a binary representation of an object which can be manipulated, stored, transmitted and displayed using digital technologies.

The following issues were taken into consideration when devising the framework of the project:

- Rationale or justification
- Suitability of collection and the digitisation requirements of the objects, which in turn led to the definition of:
- Selection criteria
- A "lifecycle" approach
- Access/user need
- The range of skills & technologies needed
- Costs
- Security and IPR (including Copyright)

Rationale

There must be justification and clarity of thought. Digitisation is not a substitute for conservation or preservation, it is merely one tool of many in the extremely complex context of promoting cultural heritage. Technologies should not be used just for the sake of them; intelligent use of the technology should be the guiding principle.

Suitability of collection

The collection of Waterford Museum of Treasures is eminently suitable for digitisation. One objective of digitisation is to reduce stress on the original objects which provides an immediate rationale for digitising those objects. Thinking in terms of the requirements of the various objects oriented the staff at Waterford Museum of Treasures towards the establishment of selection criteria.

Selection Criteria
See below in summary of Report 2.

Lifecycle approach
Both research and the training provided by An Chomhairle Leabharlanna at the outset alerted Waterford Museum of Treasures to the fact that a digitisation project does not proceed in a linear way. An overview and a certain level of expertise must be gained before digitisation can commence, for example, scanning or photographing to the highest resolution achievable and in TIFF format is recommended. This will have implications for later phases of the project. Also, it is best to view digitisation as involving creation, access, management (which will involve refreshing), other use.

Access/user need
It is important to create digital resources which are accessible to all via generally available media and non-proprietory formats.

Range of skills & technologies needed
A range of skills is required from curatorial to technical, not often found in the same person. Projects will run more smoothly if I.T./I.S. personnel are involved right from the beginning. New technology will be needed and mastered so there must be an investment in this and in staff training. At Waterford Museum of Treasures the I.S. Department of Waterford City Council were brought on board right at the beginning. The hard and software requirements for digitisation are dealt with in more detail below.

Costs
The biggest outlay is staff time and secondly the technology, which may seem prohibitive. However, these costs must be seen in context that new technologies and expertise in them have been gained which can be re-utilised. Also, the re-use of the digital resources created will maximise returns on the outlay.

Security and IPR (including Copyright)
The security and integrity of the site content must be guaranteed, therefore there must be built-in quality control. The security of the user of the www is only an issue if they were to order a print of the object online. The decision was made early that that facility would not be made part of the askaboutireland.com content put up Waterford Museum of Treasures. The end user is invited to make contact with Waterford Museum of Treasures if they want to order a print-quality copy of the image. The issue of Intellectual Property Rights including copyright has to be addressed: there must be clarity as to who owns the copyright of the site content and a copyright notice must be put on the site.

The technical requirements -

- **Camera**
- **Scanner**
- **P.C.** of at least 256 MB RAM, 80 GB HDD, 64 MB graphics card *or* Mac equivalent
- **Image editing software**
- **3D software package**
- **System resources** such as backup & write-to media (e.g. CD-R) capacity

A digital **camera** was chosen by Waterford Museum of Treasures, the Fuji FinePix S601 Zoom, a "professional" camera, with accessories such as tripod, turntable etc.

- Spec

No. of effective pixels:	3.1 million pixels
File format:	still image JPEG or TIFF-RGB
Storage media:	Slot 1: SmartMedia card Slot 2: Microdrive

- Was the recommended camera of several suppliers
- Cost €792.40 inc VAT (camera only)
- museum staff had no prior experience of digital cameras but had basic knowledge of photography

TIPS FOR SELECTION OF CAMERA

- minimum no. pixels 3.1 million
- a remote control (not possible with camera chosen for this project) and a tripod are musts
- other extras may not be needed e.g. floppy disk adapter
- compatibility with other soft & hardware
- running costs

The **scanner** used by Waterford Museum of Treasures was the Hewlett Packard Scanjet Pro 7400c, a robust production level scanner.

- Spec
  2400 dpi flatbed scanner with transparency/slide and negative adapter
- Cost c.€550.00 (previously purchased)

TIPS FOR SELECTION OF SCANNER

- High resolution (density of information captured, expressed in dpi & ppi)
- bit-depth (level of colour captured, ranging from 1-bit (bitonal) to 48-bit (publishing))
- dynamic range (range of tones)
- production-level scanner is needed
- compatibility with other soft & hardware

Waterford Museum of Treasures purchased one new **P.C.** and upgraded a second, as follows:

1 new p.c.

- Spec

512 MB 133 Mhz RAM
80 GB HDD
64 MB Graphics Card
internal CD-RW & 16 x DVD-ROM drive
Windows 2000
Normal other features

- Cost €1,318.90 inc VAT

2nd pc upgraded

- Spec

Increase RAM to 512 MB 133Mhz
Increase HDD to 80 GB
Internal CD-RW
64 MB Graphics Card

- Cost €394.46

Waterford Museum of Treasures chose Adobe Photoshop V.7 Win as the **Image editing software**

- Functionality best for project in hand
  Including "history" i.e. the technical info about a particular image.
- Recommended by other users within Waterford City Council
- Needs 90 MB RAM, 200 MB h/d space & CD-ROM; the higher the spec of the p.c. the better the performance
- Cost: €1,046.65 inc VAT

TIPS FOR SELECTION OF IMAGE EDITING SOFTWARE

- hardware requirement is large or the program will not run to its full capability
- functionality – the features offered e.g. file format support, & suitability for the project in hand
- consider cost including staff training needed & upgrades

In terms of **3D software**, 3D Photo Builder was purchased off the internet by Waterford Museum of Treasures. The 3D image is brought about by the use of scripting (called java applets) to blend several images together seamlessly into a *dragable* 3D image. See "The Issue of 3D" in this Report.

- Cost €97.20 including turntable

For **system resources**, both p.c.'s have an internal CD-RW; also, Waterford Museum of Treasures avails of Waterford City Council's secure server.

Summary of Report 2
Digitisation of a Museum Collection
- selection criteria, selection & a plan framework for digitising

This Report documented the move from the planning stage to the realisation of the project which begins with establishing selection criteria and then the actual selection of objects for inclusion. The Report can be summarised as follows:

- Establishment of selection criteria
- A workplan for digitising the selected material
- Proceed to making of digital images of objects using the new hard & software.

Selection criteria & selection of objects
The www is useful for trawling but recommendations re minimum/baseline criteria could be drafted. This is a deceptively complex and time-consuming task.

Workplan
A tracking system is essential for digitising the objects.

Actual digitisation
Using the new equipment, proceed to digitisation. Expertise is built up of the new hard and software. This is where projects will diverge as objects have different requirements so there is little value for standards/guidelines here other than very generic ones. This will probably be one of the longest activities of the entire project.

Selection criteria –

Waterford Museum of Treasures established the following criteria:

- Unique/important/prestigious object
- Variety of material
- Condition
- Representative of entire Collection
- User demand/interest
- Object where the Copyright was either owned by Waterford Museum of Treasures or permission was forthcoming to use it
- Relationship to other projects e.g. image could be reused
- Feasibility of image capture, some in 3D
- Feasibility of other digitisation requirements of object e.g. creation of metadata
- Cost – no extraordinary costs pertained to digitisation of the object

- Timescale
- Accessibility to all including disabled via generally available media & non-proprietary formats.
- Any object of sensitive content would be excluded.

TIPS FOR SELECTION CRITERIA

- Consult other museums whose websites are impressive and provide a model to emulate. The benefits of others' experience (scope/parameters of project; salient features; selection criteria; workflow; mistakes made/recommendations) are *enormous*.
- In practice the best/most complete/most prestigious objects are always chosen.
- Often in practice objects are chosen where a professionally taken, high-quality image already exists.
- Objects are rejected for pragmatic reasons e.g. copyright or provenance unclear, the object is in need of conservation, object is inaccessible.

Selection –

Finally 40 objects from the collection of Waterford Museum of Treasures were chosen for inclusion, using the museum catalogue, as a representative sample. The objects ranged from the Kite Brooch, 39 mm long, to the Great Charter Roll, 4 m long and in date from Viking to 19th century; all the main material categories were represented – including wood, metal, textiles, stone, skeletal material, glass, pottery, parchment, leather; all the main categories of object were represented – including canine, civic, domestic, ecclesiastical, equine, military, pastimes, personal adornment, portraits, tool. The majority of objects were 3D but paintings and the two manuscript objects, the Great Charter Roll and the Charter of Queen Elizabeth I are 2D. The decision was made to make the objects available, including those imaged in 3D, through the search engine and not separate from the entire catalogue online. The interfaces of the online catalogue went through several refinements.

Some of the best – most complete and/or finest quality – objects from the collection were chosen. For some objects a high-quality image taken by a professional photographer already existed and this was used since it would not be bettered.

A format was designed for each object to consist of a descriptive paragraph, an image and a table of standardised details (the following is that for the child's ring-brooch).

DATE/PERIOD:	c.1250 A.D./Anglo-Norman
COLLECTION	Waterford City Council
DIMENSIONS	20 mm diameter
MATERIAL	copper alloy
INVENTORY NO.	1999.493
PROVENANCE	found in excavations of Waterford city centre 1986-1992

Location	Waterford Museum of Treasures exhibition
Further reading	*Late Viking Age & Medieval Waterford Excavations 1986-1992*. ISBN 1 872002 98 6

(See Waterford Museum of Treasures pilot project site "View the Collection Online!" on http://www.askaboutireland.com)

Plan for digitising

The minimum needed is a tracking system. The following is a sample from the table that was devised as a handy at-a-glance guide to progress with the digitising. This table underwent a lot of changes as the project progressed but remained useful in different guises.

CATE-GORY	OBJECT	WHERE? (on display unless otherwise stated)	Inventory No. Or Mus. Reg. No.	Image (on F drive unless otherwise stated) - name, size & format of file	Image Master copy (TIFF)– CD name & size of file	surrogate image location	Story-line (tick or date) & its location	Quality Control (meta-data & images)	Copy-right cleared	Up loaded to www
Viking Age/jewellery	12th century Kite brooch		1999.1754		MasterCD 1 7.57 MB					
Anglo-Norman	13th century gold ring brooch		1999.489		2.76 MB					
"	Child's ring-brooch		1999.493							
"	belt-mount		1999.494							
Religious/ jewellery	finger-ring		1999.492	Religious ring (crop out text) 2 images on K	MasterCD 1 2 images: 205 KB intaglio 1.32 MB					

Summary of Report 3
Digitisation of a Museum Collection
- use of the hard and software & other technology for digitisation and www publication
- security & integrity issues including copyright

This long report documented the production of the various elements required for digitisation and www publication (including 3D images and the searchable online catalogue) and the use of the technology. It listed the training needs for digitisation. and also dealt with the issue of Intellectual Property Rights most often called Copyright. The report covered the following:

- Production of text and images, including 3D
- Use of hard and software
- www publication – standardised formats & the online searchable catalogue
- other technical skills needed for digitisation and costs
- security and integrity issues including copyright & IPR

Production of text and images

A schedule for photographing the objects was set out, needed as most are in the permanent exhibition. It is recommended that the image for an object should be produced first as it is rare that a storyline can not be produced but quite possible that an image can not be made (object inaccessible/too fragile). Production of text may involve original research and is difficult in advance to quantify in terms of time required. For Waterford Museum of Treasures it acted as a test of the catalogue. Aim for images requiring as little enhancement as possible.

Hard and software

Camera - Fuji Finepix F601 zoom, installed by the supplier along with the cradle and software for easy download to the p.c.

- very user-friendly
- Photograph at the highest or near highest *file size* and highest *quality* to ensure highest resolution. Download in Photoshop and save as as big a TIFF as possible mastercopy (tagged image file format, a lossless format supported by the major operating systems & image editing software).
- Auto mode with the macro setting and use of zoom produced good results for most objects, silver objects necessitating use of the manual mode with manual focus. Shiny objects such as silverware were the most challenging.
- Use natural light as much as possible. Flash is not permissible for parchment, textiles or paintings.
- At Waterford Museum of Treasures, objects were photographed against a pale blue back cloth where the horizontal and the vertical were “blurred”, using the camera on a tripod to minimise camera shake.

- Used in conjunction with a turntable for 360° photography for a 3D image, cost €97.20 (includes software).

Scanner - hp Scanjet Pro 7400c

- Scan at highest optimised resolution, creating as big a TIFF as possible e.g. 40MB for the mastercopy. This was found to be 300 dpi (dots per inch).

P.C.

- Working with images and sophisticated software demand a high-spec p.c. and a high level of user expertise.
- Minimum recommended spec:
  512 MB 133 Mhz RAM
  64 MB graphics card
  minimum 80 GB harddrive or network capacity (for images)
  internal CD-RW

Image editing software - Adobe Photoshop V.7 Win

- The resolution of the saved TIFF mastercopy was frozen. Images (physical size) were saved as jpegs as follows (these were the web copies):
  - "tall" object 240 pixels wide x 350 pixels high
  - "wide" object 380 wide x 265 high
- Sharpening was applied.
- The batch facility of Photoshop was found to be very useful.
- Do crop out excess background before saving so as not to waste disk space.
- Do not compress images.
- It is unethical to manipulate images other than in terms of resolution (expressed in dpi & ppi), colour (expressed in bit-depth) and tone range (often called dynamic range) or image size, or general cleaning up (removing dust and scratches).
- It is permissible to alter the background of an image, e.g. use clone tool to get rid of folds in cloth backdrop. However as already stated, it is best to get high-resolution professional-standard photographs that need no "enhancement".
- A surrogate copy of the mastercopy was saved as a JPEG (Joint Photographic Experts Group).

3D package – 3D Photo Builder
See The Issue of 3D in this Report below

- Very user-friendly interface
- Cheap
- Can also be used to produce panoramas

www publication

www publication is complex, involving both technical and creative/design aspects. The resources (text, images, catalogue) created by Waterford Museum of Treasures were prepared for their correct format for web publication. The pre-ordained pages of askaboutireland.com were edited using Front Page Express and the new versions

uploaded. The most complex component was the online catalogue. A website should have both high-quality content, be visually attractive and unfussy/uncluttered, helping to make it user-friendly, which is important.

TIPS FOR WEBSITE DEVELOPMENT

- Plan in advance the content and layout of each page or element of the site so that as a whole the site is coherent and consistent.
- It is very important to upload only after thorough checking.
- That said, practice of the webpage package and uploading is needed in advance of the final version.
- Aim – on a page – for the minimum of scrolling needed.

Standardised formats

The following are non-proprietory, therefore available to all with an average browser.

- Text based content – HTML (HyperText Markup Language)
- Image – *master copy* – TIFF (tagged image file format) – store on CD-ROM
- Image - *surrogate copy* – bitmap or jpeg – as a more everyday copy to be used e.g. as a link to the catalogue package
- Web copy – jpg or gif at 72 ppi (at higher resolution the download time is too long)
- 3D image – a number of jpg's plus an extra file that blends them together.
- Video – MPEG 4 (or perhaps the proprietory formats Microsoft AVI, ASF or Quicktime)
- Sound/audio – Microsoft WAV, MP3, Real Audio, or Sun AU formats.

Online searchable catalogue

This involved four separate activities:
Exporting the Data, Building the Search Results, Building the Search Engine and Putting the Finished Product Online.

The catalogue package in use since 1999 at Waterford Museum of Treasures is Adlib. In order to make this into an online searchable, indexed catalogue, it was necessary to export the data (which is not normalised) to a compatible format. This was achieved with MS SQL server's elements. This product sits on a Windows 2000 server in a secure SAN (Storage Area Network).

The Data was exported from Adlib to an Excel format and from Excel into SQL server. It was not possible to export directly from AdLib into either SQL or Access.

The data was secured in the SQL database. Pages for the 40 selected objects were created which would be returned through the search engine. These pages were created in Macromedia Dreamweaver 4 and consisted of HTML, Adobe PhotoShop altered images of the given items and the text/storyline for each object.

This part of the project was done with Tango 2000 – a programming suite of tools from Piercom, Limerick, a subsidiary of WiTango Australia.
This unique programming language enables the user to build searches based around an SQL database where the user can select which data to query and so on.

The search engine was made available online at http://www.askaboutireland.com and the intention is to put it on the Museum's own website http://www.waterfordtreasures.com.
This very technical task – the first time the Adlib package was put online in Ireland – was performed by the I.S. Department of Waterford City Council.

Technical skills & Costs
A range of complex skills from I.T. to curatorial are required to conduct a digitisation project, depending on the existing expertise of staff. The skills and experience gained by the project team at Waterford Museum of Treasures by this project are enormous. The initial 2-day training given by An Chomhairle Leabharlanna was excellent, giving an overview of digitisation concepts and terminology; www uploading; internet research and report-writing.
Photography
Scanning
Knowledge of imaging – format, image size, resolution, preservation
Proficient use of image editing software
Research and project planning
Project management and report writing
Team leadership
Curatorial
Cataloguing and Metadata creation
Database design & Search Engine creation
Intellectual Property Rights and Copyright
Web creation, both creative and technical
CD -RW
General p.c. proficiency

Costs
The biggest cost will be staff time but this could vary enormously depending on existing staff expertise. It must be stated that the initial outlay on hard and software and staff skill upgrades, is once-off, but the returns will be ongoing. The usefulness of a camera, scanner and the skills to digitise goes beyond digitisation initiatives per se. Such hardware must nowadays be considered standard in a Museum or other cultural institution such as Waterford Museum of Treasures where we are always dealing in images on promotional or educational material, advertising, publications, invitations, internal for cataloguing etc and a legion of other uses. This points up the lifecycle or re-use nature of digitisation. The following in € were the hard and

software figures and staff training figures for this project which can be taken as ballpark figures. It must be stated that the image editing package Paintshop Pro might sufficient , cost €180 as opposed to the €1,146 of Adobe Photoshop.

Hardware (camera and accessories, scanner, p.c.)	3,200.76
software	1,143.85
staff training	1,300.00

After the initial outlay, there are huge economies of scale as the only cost of creating digital images of all the (main) objects in a collection is staff time. The "other use" can easily justify this time outlay.
Outsourcing pieces of work adds to cost and it is recommended that as much as possible work is not outsourced so that experience and expertise is built up inhouse.

The issue of IPR
The entire area of IPR is complex and relates not only to the copyright issue but to the integrity of the project (which links to quality control). There are two aspects: that the Museum has permission to reproduce the material chosen and that it protects the material from undue exploitation. The copyright issue requires a clear stance before any publication can happen, and a copyright and perhaps also a disclaimer notice should be included on the www. Current Irish law is the Copyright & Related Rights Act 2000. The following summarises the stance taken by Waterford Museum of Treasures in this project:

It was decided to work from the premise that the holder of title to an object holds the copyright. In the case of Waterford Museum of Treasures's collection of archaeological objects, this was not the maker but the owner. This was based on Waterford Museum of Treasures's status as a designated repository under the National Cultural Institutions Act 1997 and on the rationale of the common good/in the interests of public education. These objects are in the public domain. The Museum has a good relationship with 2 or 3 professional photographers who have photographed over the years on the long-established basis that we are free to use their images freely.

- Waterford City Council/Waterford Museum of Treasures owns the copyright & IPR rights to the objects in its collection/in its care. The IPR extends to all digital use of the objects.
- In keeping with Waterford Museum of Treasures's policies on Accessibility and Education, we want to disseminate awareness of our objects as widely as possible without restrictions for the public good.
- Permission was sought for www use of images of loaned objects. Permission was readily given.
- It was decided to put up a copyright statement as follows: **The copyright and all other intellectual property rights of all the contents - images and text - rest with Waterford Museum of Treasures. The contents may be used for private use only. Any use of the text should be acknowledged. Images may not be duplicated in any media, electronic or otherwise, without the permission of the copyright holder – Waterford Museum of Treasures** and then the contact points. **For publication-quality images, please apply to Waterford Museum of**

Treasures. For the latter we would charge a nominal handling fee in line with current policy and practice.

- It was decided not to disable the print/save as function on the web page, in the interests of public access e.g. children doing school projects or use by educators in general. The image size is not such that we have many worries about exploitation of our objects.
- It was felt that the latter decision plus the copyright statement struck the correct balance between access and publicisation and protection of the collection of Waterford Museum of Treasures. The last thing museums should be seen as is anti-access and over-precious about its objects which are, after all, in care for the common good. Indeed wider publicisation of the Collection was among the reasons to digitise.
- Watermarking can be done using Adobe Photoshop or Paintshop Pro. This involves embedding a separate layer into an image, containing text, a logo or copyright details.
- It is strongly recommended that people who loan objects to a museum are made aware that use of images of their objects will not be for any commercial gain by the museum. Once the entire operation of the museum is permeated with the ethos of "not for profit" and that the collection is held in trust for public good/education/access (this has implications for the governance, management, documentation indeed all areas of operation of the museum), most people are very happy to allow use of their objects and are encouraged to gift them outright (the ideal from the museum's point of view).

Summary of Report 4
Digitisation of a Museum Collection
- preservation & management of the digital archive including metadata & tagging

Future preservation and management of the digital resource are vital because of obsolescence in a rapidly changing technological environment. Data migration (periodically converting material to newer formats to avoid obsolescence) and refreshing (periodically copying the CD-R onto another) must be continued into the future. These strategies will maximise the return on the initial investment. A basic metadata schema was adopted to ensure easy retrieval of the resources.

- The preservation & management strategy
- metadata
- maximisation of return on the investment in digitisation

The preservation & management strategy
The resource mastercopies (and surrogate images) were preserved in their *component* parts as well as in their combined forms e.g. the SQL database. The images created were copied to the huge directory stored on the secure network which Waterford Museum of Treasures holds of its Collection. The mastercopies (uncompressed TIFFS) were preserved on WORM (Write Once Read Many) CD-R, the most universal media format, life 5-10 years. DLT (Digital Linear Tape) (30 year life, 40MB capacity) is another option. The surrogate copies (gifs or jpegs) were also preserved on CD-R as were the folders (each consisting of 18 jpegs, one html file plus another file) for each 3D image. The SQL database is stored on a server in a secure SAN (Storage Area Network).

Metadata
The area of metadata and markup languages, tagging etc was found to be extremely difficult to deal with, the terminology being very challenging. Metadata is commonly "data about data" but the best definition found in the course of this project is "structured information that describes and/or allows us to find, manage control, understand or preserve other information over time". A good guideline is that the digital resource needs to be described only in sufficient detail to support its management and access. Implicit metadata is image size, format, creation date; an example of explicit metadata is the creator. The following metadata schemata, developed in the interests of interoperability, were looked at:
JIDI standards
Dublin Core Metadata Element Set (DCMES) – 15 elements designed to enable the simple description of networked resources.
Machine Readable Cataloguing (MARC)
W3C's Resource Description Framework (RDF) – an infrastructural development

MPEG-7 – also an infrastructural development
For images: Visual Resource Association Core categories v3 (VRA 3)

- 17 core elements but without the intricacy of the MARC standard. Intended for the visual arts and with an established mapping to and from both DCMES and MARC.

Open Archive Initiative (OAI)

A basic schema of some of the DCMES elements, which was an add-on to the "tracking" table outlined in Report 2, was used for the resources of this project. The fact that the objects are so much in the public domain (they have been published more than once) and Waterford Museum of Treasures holds copyright for almost all, makes the issue easier.

The most important finding of this project with regard to metadata is the need for national standardised controlled vocabularies or thesauri, for describing and for categorising objects. The Adlib Users Group has committed to an agreed national standardised use of Adlib, by September 2004. An initiative of the National Museum of Ireland to produce a dictionary of archaeological terms, is at a preliminary stage, and there is also a Terminology group within the National Museum. These developments should be fed into the Heritage Council Museums, Archives & Galleries Pilot Accreditation Scheme.

Maximisation of return on the investment in digitisation
Possible other use of the digital resources, especially images would be:

- developing or creating another website
- publications such as inhouse brochures, educational resources or a catalogue
- powerpoint presentations
- inhouse training re collection, guided tours etc
- promotional material and advertising
- for researchers e.g. they can zoom in on the images of tiny objects. This reduces stress on the actual objects.
- images can be incorporated into a computerised catalogue of a collection, towards building up a library of images of the entire collection.

One primary purpose of digitisation is to decrease stress on the original objects while increasing access to them.

It is useful to look again at the **main activities** of any Museum Digitisation project:

Main Activities of Digitisation

- Research digitisation & gain an overview of what has been done
- Plan the project, establishing parameters, schedule, cost, objectives and the rationale
- Establish selection criteria
- Select objects, using the museum catalogue
- Establish the digitisation requirements of these objects with a timescale and costings (e.g. by doing a pilot within the pilot)
- Purchase equipment and learn to use it
- Photograph or scan
- Write text (may involve research)
- Create the elements necessary for www publication
- Liaise with those undertaking the website or other elements of the project, whether outsourced or inhouse

Additional tasks for a pilot project

- Report-writing
- Project-management
- Presentations/workshops in liaising with the wider museum/archive/library community

Tasks specific to this project

- 3D version of some images
- Sample of catalogue searchable online

The Issue of 3D

3D in general

3D fits within the area of interactivity and is a rapidly expanding and changing area. Panoramic views and virtual tours are available on many websites with real estate and product cataloguing to the fore. In the cultural sector, science museums are to the fore with interactive elements on their websites. There is much talk of virtual museums. Report 3 (pages 10-13) gave some examples of the use of 3D in museums and other cultural institutions. The more elaborate the interactive element the more likely that additional software or plugins or a high-speed connection are to be needed. The average browser (low-speed internet connection usually through a 56 kb/ second modem) does not support these. The point was made that museums have more elaborate elements available inhouse – they can be put on the www as and when the average browser is upgraded.

The use of 3D

Report 3 gave some examples of the use of 3D on sites. The software is readily available to make 3D images and panoramas – hundreds of packages are available. Obviously, the higher the spec of the end user's P.C., the quicker the download and interactivity time. There are many developments and initiatives in this entire area. Since the production of Report 3 we have learned of a technology being developed in Cambridge, U.K., to make 3D images.

How a 3D image is made

The 3D image is composited together using specialist 3d imaging software such as "3d photo builder". The object was placed on the turntable and photographed at every second setting, then the 18 images were blended together using 3D Photo Builder. The 3D technology itself is brought about by the use of scripting (called java applets) to blend several images together as if it were a 3D image - an important feature of this programming language's ability is to then allow the user to "interact" with the item, for example being able to drag and enlarge items at will. Much of the functionality of these programmes is now being built into more standard desktop applications such as the latest version of Corel Draw and Adobe Photoshop.

Neither is there any shortage of developers and multimedia companies able and willing to undertake 3D and other interactive elements. The downside of using them is the relatively high cost and the fact that no inhouse expertise is gained.

The 3D results of this project

This pilot project has shown that high-quality 3D images can be produced inhouse and published on the www at relatively low cost. However, as stated in Report 3, intelligent, selective use of 3D is the guiding principle, not just 3D for the sake of it. In the case of some objects – a painting or even a sword for example – there will be no benefit to the end user to have a revolving image. It must also be pointed out that this project achieved a rotating image but not a total virtual tour of an object from all angles, although this is also eminently possible.

At this point it is useful to evaluate this particular project:

Achievements of this pilot project

- Inhouse experience of how to conduct a digitisation project.
- Project management experience applicable to any project.
- Inhouse specific technical knowledge of imaging (formats etc), image editing, www both generally and specifically in terms of page building, photography, etc.
- Hardware & software required to digitise and the expertise to use these.
- Also a software package which makes a 3D image, and a panorama image.
- Inhouse a general understanding and experience of, and in I.S. department the experience of producing 3D images.
- The creation of the searchable catalogue online (by far the most technically complex task of the project).
- The museum catalogue was put to the test.
- Awareness of the need for standardisation of use of catalogue – thesauri, controlled vocabularies. This will bear fruit through the Adlib Users Group, the Heritage Council museums, archives & galleries Pilot Accreditation Scheme, the LACG (Local Authority Curators Group) and through liaison with the National Museum of Ireland. Also presumably at a high level in the CNCI (Council of National Cultural Institutions).
- Awareness of issues of metadata, preservation and management of digital resources.
- Upgrading of other general technical skills.

Lessons learned

- I.S. staff need to be involved right from the beginning.
- The need for a good plan with a timeframe and the need to stick to it. If elements are going seriously beyond the timeframe, they need to be cut short.
- This calls for good project management and leadership.
- Need for broken down costings assigned to the various elements.
- The need to keep abreast of and take advantage of the latest technologies if cultural institutions are to retain and gain hearts and minds, in a multimedia environment.

Overall Conclusions & Recommendations for future digitisation projects

- There are several excellent resources on digitisation available. A few good resources are better than many less good ones got from trawling the www. This may be the same as concluding that training in efficient use of the www is needed.
- Depending on the I.T. skill level of staff, much in the available resources on digitisation is quite mind-boggling before concrete experience.
- Digitisation projects will be more easily achieved if staff with I.S. skills can be involved. This will reduce costs because of time saved in training and less work has to be outsourced.
- Baseline standardised guidelines in the areas of cataloguing, metadata, www publication, digitisation of objects, will make projects easier, more efficient and more effective. As just some examples, they will reduce research time and will help towards interoperability.
- The parameters of the project need to be clearly worked out between the partners.
- Project participants can provide invaluable support to each other, therefore the more interaction between them the better. Some reinvention of the wheel and time spent in research or technical tasks can be saved by sharing
- Some reinvention of the wheel is inevitable as the concepts and technologies are very challenging but it can be reduced by written guidelines and standards.
- It is difficult if not impossible to get it perfect. Do something and feed the lessons learned into the next project.

Bibliography

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A centre of expertise in digital information management, providing advice and services to the library, information, education and cultural heritage communities. Funded by Resource: The Council for Museums, Archives & Libraries, the Joint Information Systems Committee (JISC) of the Higher and Further Education Funding Councils, and the European Union. UKOLN also receives support from the University of Bath where it is based.

http://www.jisc.ac.uk/
The Joint Information Systems Committee

http://www.tasi.ac.uk
Technical Advisory Service for Images & the cardpack

http://www.heds.herts.ac.uk/
Higher Education Digitisation Service

http://www.nla.gov.au/padi
National Library of Australia – Preserving Access to Digital Information

http://www.bl.uk/npo
National Preservation Office. Also its publication *Managing the Digitisation of Library, Archive & Museum Materials*

http://www.ahds.ac.uk
Arts & Humanities Data Service

http://www.bl.uk
The British Library

http://www.askaboutireland.com
The Cultural Heritage Pilot Project

http://www.waterfordtreasures.com
Waterford Museum of Treasures @ the Granary

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Irish Public Service Metadata Standard (IPSMS)

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The INDECS Metadata model

http://uk.dublincore.org/
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Open Archives Initiative

http://www.vraweb.org/vracore3.htm
Visual Resources Association Core categories

http://www.w3.org/RDF/
Resource Description Framework

http://www.leeds.ac.uk/cedars/guideto/metadata)
curl exemplars in digital archives

http://www.knaw.nl/ecpa/grip/
National Archives of Netherlands & European Commission on Preservation and Access – Gateway for Resources & Information on Preservation
http://www.archimuse.com/mw2003/speakers/index.html
Archives & Museum Informatics, Canada