

Digitisation

a simple guide for museums

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Introduction

In 2008 the number of devices connected to the internet outnumbered the human population. Internet usage is a central part of many people's daily life, and lots of museums, galleries and archives are responding to this by digitising their collections.

A digitised collection is a flexible resource for any museum and can be used in a variety of ways from engaging online audiences, to enhancing catalogue information, exhibitions and learning packs. Good images form the heart of any good digital archive. With this in mind, this guide provides practical information for museums on creating good images using a scanner or a digital camera. It provides information on what to consider when undertaking a digitisation project and how to manage digital images. It also provides links to other resources.

Digitisation – where to start

It is not practical or desirable for museums to digitise their entire collections. Creating a digital copy of a whole museum would create a second, virtual museum to look after. Therefore, before embarking on a digitisation project, it is important to start by prioritising which collections to digitise. You could:

- Link a digitisation programme to your collections programme. If you are in the process of cataloguing or reviewing a collection, it may be a good moment to capture digital images of the material.
- Digitise your museums 'star items' for your website
- Create digital images of your most fragile items
- Digitise and publish online images and information on collections that are central to your museums theme or location.
- Link a digitisation programme with the development of new exhibition.

There is no right or wrong way of prioritising what to digitise. However you decide to prioritise, it is useful to capture the work in the museums forward plan so that it links to the organisations overall development strategy, or to develop a separate digital strategy that is connected to the forward plan. The key is not to embark on a digitisation project that is too big. Start with just a few items and experiment with creating and using images.



Useful resources to get you started:

Managing the Digitisation of Museum, Library and Archive Materials, by the British Library.

<http://www.collectionstrust.org.uk/media/documents/c1/a105/f6/000505.pdf>

Evaluate your digital strengths and weaknesses using the Collections Trust Digital Benchmarks tool.

<http://www.collectionstrust.org.uk/item/1608-digital-benchmarks-for-the-culture-sector>

Explore how to create a digital strategy with SHARE Museums East's animation 'Digital Strategies – ideas for small museums.'

https://youtu.be/0k_7ohdLFFU

Why Digitise: the costs and benefits of digitisation, from Digitising collections: strategic issues for the information manager, Lorna Hughes, 2004

http://www.facetpublishing.co.uk/downloads/file/sample_chapters/digitizing%20collections%20chapter%201.pdf

EU paper on digitisation 2010

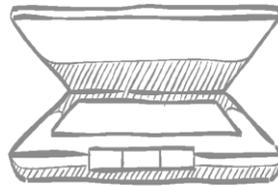
http://www.lending-for-europe.eu/fileadmin/CM/internal/handbook/Karvonen_ECM.pdf

Approaches to digitising artefacts and archives – scanner or digital camera?

Once a collection has been prioritised for digitisation, it is important to consider what equipment the museum may need to invest in. If you are digitising a paper archive only, you could use a scanner. But, if you are digitising 3D artefacts, you will need a digital camera. A camera is more flexible as it can take images of 3D and 2D items. The image quality from a camera is also likely to be better than a scanner, but cameras require much more technical knowledge.

Digitising with a scanner

If you are digitising a paper archive, a scanner is a good and easy to use option. Scanners come in a range of types including drum, handheld and specialist book scanners, but for most museums a flatbed scanner is the best and cheapest option.



Choosing a scanner

The important factor to look at when choosing a scanner is its resolution. Most scanners will have their resolution defined by two numbers, for example 600 x 1200 dpi (dots per inch). The first of these two numbers is the important one, this is the optical resolution; the resolution at which the scanner captures the image. If you are capturing text only, a resolution of 300 dpi may be adequate, but if you are scanning images, you will need a higher resolution. There are specialist scanners available for digitising film and glass slides; these typically have very high resolutions of around 5,000 dpi.

If you have chosen a large archive to scan, you will need to consider the speed at which the scanner works. You will also need to consider the size of the originals you are scanning; you may want to choose an A3 scanner.

How Scanners work

Scanners are driven by software that runs on your computer. When you place a document in the scanner, you usually control the scanning process from your computer, although some devices allow you to control the scanning from the scanner itself. The software will usually offer you a range of image processing options. These options might include colour or tonal optimisation, image sharpening or automated dust or scratch removal, and will be in addition to selecting the resolution, scan area and reflective/

transmissive quality. Care should be taken with enhancement settings. For example 'cleaning' an image can degrade the quality of the scan. The higher the quality you can achieve in the original scan, the less editing the final image will need.

Scanned file types

Scanner software will offer a range of file formats for saving images, including PDF, JPEG and TIFF. Select the file type you wish to use. TIFF files are usually recommended for saving high quality master copies, but they are not useful for web use; you may prefer to use PDF for text and JPEG for images as they take up much less room and are more flexible. There is more information on file types below, but for detailed information look at: http://www.jiscdigitalmedia.ac.uk/infokit/file_formats/digital-file-formats

When you save your image files, give them unique names that can be linked with the rest of the information you hold about each item. For information on naming files look at the following: <http://www.jiscdigitalmedia.ac.uk/guide/choosing-a-file-name> Once you have captured and saved your scans, you will be able to edit them in a picture editing programme.

If you have very fragile items or books with delicate spines, you can pay a professional organisation to scan them for you. Organisations such as record offices, universities and large archives will have specialist scanners.

Further information:

For further detailed information on scanners have a look at: <http://www.jiscdigitalmedia.ac.uk/toolkit/digitisation-equipment/scanner>

How to use a scanner – Dummies Guide
<http://www.dummies.com/how-to/content/how-to-use-a-scanner.pageCd-storyboard,pageNum-1.html#slideshow>

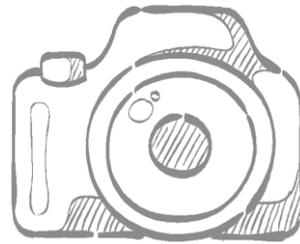
A useful guide on using a scanner
<http://www.theologyontheweb.org.uk/how-to-digitise.html>

Digitising with a digital camera

If you decide to use a digital camera for digitising, you will need a space in your museum to set up a small 'photographic studio'. This can be permanent or temporary and does not need to take up lots of space; a table top should be big enough if you are taking pictures of books or small to medium sized objects. Your studio will need the following equipment:

- Digital Camera
- Two lights
- Plain backdrop
- Tripod
- Table
- Remote shutter release switch

You may also want a camera or light tent, and a photographic stand instead of a tripod.



Digital Cameras



The best camera to buy would be a Digital SLR (DSLR) or high quality compact camera that allows you some control over shutter speed and aperture.

Digital Cameras are like traditional film cameras, but rather than capturing an image on film, they capture images on a sensor. The sensor captures light through small pixels and turns the information into digital data. It is true that the greater the

number of pixels a camera can handle the better the picture, e.g. a 16 megapixel camera is better than an 8 megapixel, but this is not a guide to quality by itself. The number of megapixels has to be looked at in terms of the size of the sensor.

The easiest way to think of the sensor is as the film in a conventional camera. A full frame sensor captures an image on an area the same size as a 35mm film frame (24 x 35mm). DSLR cameras do come with full frame sensors, but they might be expensive. A camera with a 17 x 13mm sensor would be suitable for digitising collections, but a 6 x 5mm sensor would be too small.



The Lens



DSLR cameras can take interchangeable lenses and the best lens to buy for optimum resolution would be a fixed lens with a focal length of 50 to 60mm. This is the standard usually supplied with a DSLR.

Most cameras that can't take interchangeable lenses have the ability to zoom from around 24mm up to 500mm. It is worth going to a professional camera shop and discussing what would be best for your needs and your budget.



File Formats

Before you start taking any pictures, you will need to think about file formats. The three main file types you will need to know about when capturing and saving digital images from your camera are:

RAW - a raw file is an unprocessed file that retains all the information captured by the camera. Raw files are very large, but are very adaptable as changes can be made to exposure and sharpness on the computer if you have the correct software.

JPEG – a JPEG is a compressed file. They are much smaller than raw files as some information is lost when they are compressed. Most cameras will save images onto the memory card as a JPEG. JPEGs are flexible, they can be resized and used in many different ways.

TIFF - TIFFs can be created from RAW files on your computer, and can be compressed without losing any information. TIFFs are larger than JPEGs and take up more memory space on your hard drive. They are also not suitable for use on websites.

If you are digitising collections to produce a high quality archive, as with scanned images, it is usually recommended that you save master copies as TIFFs. However, if you are using the images to enhance your website, upload to a collective website such as Culture Grid, or to add to your catalogue, you should use JPEGs. You will generally need to down-size JPEGs and resave them for use on the web.

Your camera can save files as large JPEGs (JPEGs with low compression) these are likely to be large enough for your needs depending on how your camera is set up.

Further information on file formats:

<http://www.jiscdigitalmedia.ac.uk/infokit/digitisation/optimising-digital-images>

<http://www.jiscdigitalmedia.ac.uk/infokit/digitisation/still-image-digitisation-home>

<http://users.wfu.edu/matthews/misc/graphics/formats/formats.html>

A quick consideration of digital preservation and file longevity

TIFF and JPEG files are open formats and are more likely to have a longer digital 'shelf-life' than proprietary files. As digital technology changes so quickly it is best to use open file formats as these are more likely to be readable on future software.

For more information on file types look at

http://www.jiscdigitalmedia.ac.uk/infokit/file_formats/digital-file-formats

For further information and resources on Digital Preservation have a look at

<http://www.collectionstrust.org.uk/collections-link/going-digital/digital-preservation>

Taking a digital photograph

Taking a good photograph is the most important aspect of any digitisation project and it is important to understand some basic aspects of photography and how your camera works to get the best results.

To get a good image you will need to think about the following things:

- **Set-up** - always put your camera on a tripod or camera stand, this will keep the camera steady. You can also use a shutter release cable to avoid any movement during the exposure.
- **The Lens** - if you are using a zoom lens rather than a fixed lens, try to fix your focal length at 50 to 60mm this will give you a good one-to-one view of the object with little or no distortion.
- **ISO** - the ISO number is the light sensitivity of the image sensor. The bigger the number the greater the sensitivity to light, but the quality of the image becomes poorer in inverse proportion. For photographing artefacts, it is best to use the least light sensitive/highest quality setting – the lowest ISO number, between 100 and 400 ASA.
- **Aperture and shutter speed** - the aperture controls the amount of light coming through the lens; lenses work at their optimum when stopped down to about f5.6 – 8. Below f4 you are likely to have too shallow a depth of field to record both the front and back of a deep object. Above f8 you are likely to not have enough light entering the camera.

- The shutter speed needs to be right for the ISO, f number and lighting conditions to obtain the correct exposure. Use the aperture priority setting and let the camera choose the shutter speed. Speeds below 1/60th of a second will cause blur unless you are using a remote shutter release and a tripod.
- Lighting and colour balance - so that colours appear natural, it is necessary to balance the light colour setting of the sensor with colour of the light lighting the object. Have a look at your camera's white-balance (WB) settings and choose the most appropriate one for the conditions. It is worth looking through your cameras' handbook for more information.
- Lighting the object - there are several approaches that could be taken to light the object, but a simple and effective way is to use the light from a window, either on an overcast day, or a window facing away from the sun. The camera can be left on its default daylight colour setting, with the flash forced to fire to soften shadows.
- If you have a removable flash unit, it is sometimes effective to either point it at a low ceiling or improvise a white card and bounce the flash light off it to create softer lighting or avoid reflection which could be a problem with glass or metal.
- If you do not have a space with natural light, you can use lamps with daylight bulbs. You will need to make sure white balance is on the right setting to compensate for this kind of light. You can also use a camera tent, which will diffuse light.
- Placing the object - it is useful with complex objects to place them at a slight angle rather than face on to the camera. Take pictures of the object at different angles, and take close-up images of important details.
- Include an appropriate scale in the picture, and a card with the objects name and catalogue number.
- Taking the picture - always try to edit in the camera. That is, try to create an image that doesn't need editing or retouching. Before releasing the shutter, look at the screen as though it was a picture. Look at each corner and note exactly what you are seeing rather than just concentrating on the object alone.

Digital cameras and photography

Digital Photography School – basic instructions on how to use a digital camera

<http://digital-photography-school.com/megapost-learning-how-to-use-your-first-dslr/>

Learn My Shot - online photography tutorials - not museum specific

<http://learnmyshot.com/light-difusion-tutorial-soft-light-vs-hard-light/>

<http://learnmyshot.com/how-to-photograph-shiny-reflective-objects-silver-chrome-metal/>

Introduction to Macro/Object Photography using the Copy Stand and DSLR (University of Nottingham - The Digital Humanities Centre) September 2013

<http://www.youtube.com/watch?v=ilbB2eO6oqI>

Jisc photographic guidelines

<http://www.jiscdigitalmedia.ac.uk/guide/photographic-guidelines#pg11>

Resolution, image size and bit depth

<http://shutha.org/node/796>

<http://www.graphics.com/article-old/digital-photography-fundamentals-understanding-resolution-and-bit-depth>

Downloading and saving images

When you have finished taking photographs, or your memory card is full, download the images onto your computer. You can plug your camera's memory card direct into many modern computers, or you can use a USB cable to plug in a memory card reader, or you can plug your camera directly into your computer, again using a USB cable.

If you have saved your images as RAW files on the camera memory card, convert these into TIFF files. You may need to download conversion software to do this.

Once they are converted, save a master copy of all your images. As with scanned images, give your image files names that are unique and that can be linked with the rest of the information about each object.

Make a back-up of your master files. You can make back-ups on DVDs and memory sticks, or a cloud drive. Keep one copy of your image archive off site. For further information on the cloud look at:

<http://www.jiscdigitalmedia.ac.uk/pdf/little-guide-to-cloud.pdf>

Once you are sure all your originals are saved, delete them from your camera memory card.

Transferring photos from camera to computer – a Dummies Guide

<http://www.dummies.com/how-to/content/how-to-transfer-photos-from-your-digital-camera-to-computer.html>

Editing images

There are a number of image editing programmes, some of which can be bought and others which are open source. GIMP is a readily available open source picture editing programme and provides a good level of functionality.

Programmes like GIMP will enable you to make a range of changes to your image, including adjusting the colour, cleaning over dust marks and resizing images. You can also change the file types in the editing software.

Each programme will come with guidance notes, but for a brief overview on GIMP, with links to other open source editing programmes look at: <http://www.jiscdigitalmedia.ac.uk/guide/introduction-to-gimp-image-editing-software>

Editing programmes are extremely useful, but producing a good quality original image is the most important aspect of digitisation.

Digital Asset Management

As your museum embarks a process of collections digitisation, it might be necessary to explore in more detail Digital Asset Management, a system aimed at standardising and managing the decisions around labelling, cataloguing, storing, retrieving and using digital assets. There are a range of resources outlining Digital Asset Management including:

<http://www.collectionstrust.org.uk/collections-link/collections-management/spectrum/spectrum-dam-resources>

and

<http://www.slideshare.net/collectionstrust/creating-a-damstrategyforyourmuseum>

Budgeting for digitisation

There are a number of budgetary considerations for digitisation projects. If you are undertaking a project in house, the following costs will need to be considered:

- Staff time
- Staff training
- Digitising equipment

Staff time and training will inevitably be dictated by the size of the project you are undertaking. Costs of equipment can vary and will ultimately be dictated by the budget available. Scanners can start at very reasonable prices, from around £100 or less, and go up to £20,000+ for specialist equipment. A good compact camera or DSLR will cost between £400 and £800, although you can pay much more. You will also need a good quality computer with enough memory space.

Digitisation – a summary

- Prioritise which collection you are going to digitise – and link your digitising project to your museums overall development strategy or forward plan.
- If you decide to digitise artefacts or archives in house, decide which would be your museums best approach – scanning or using a digital camera.
- Develop your budget – explore the costs of the equipment you need and assess how much staff time and training will be required.
- Learn to use your equipment – digital photography is technical, but the guidance in this document will help you take good images of your objects. Good images are central to a successful digitisation project.
- Consider the types of digital files you will be creating and whether you are looking to make a high quality archive for preservation, or a flexible archive that can be used in a range of ways. You may well be making both.
- Make sure your computer has a big enough memory and processing power.
- Create a security copy of your master files to keep off site
- Start using your digital collection – and share it on Culture Grid
<http://www.culturegrid.org.uk/>

Glossary - General

Digital	All computers and digital devices, including cameras and scanners, store and read information in a digital, or numerical (digit) format. This format is known as 'binary'.
Bits / bytes	A bit is the basic unit of digital information. 8 bits form a 'byte'; a kilobyte is made up of 1000 bytes (or 1,024 bytes); a megabyte is made up of 1,000,000 bytes (or 1,048,576 bytes).
Pixel	Pixel, which is short for picture element, usually refers to the smallest component of a digital image. The more pixels an image has, the greater its resolution and the larger the print that can be made from it. An image with high resolution will take up more storage space, but can be enlarged significantly.
Digital Asset Management (DAM)	DAM refers to the processes and practices involved in creating, describing, storing, discovering, re-using and preserving digital assets.
Metadata	Metadata is Information about information. With reference to digital material, metadata is usually information about the creation and content of an individual or collection of files.

Scanners

dpi / spi	A scanner reads colour information from the item being scanned and records that information as a grid of pixels. The amount of information collected is determined by the resolution of the scanner, which is measured in dots-per-inch (dpi) or samples-per- inch (spi) . The dpi or spi of a scanner denotes the number of 'samples' the sensor captures in each inch
Interpolation	Interpolation is where a scanner creates extra pixels to sit between the ones it has scanned in order to enhance picture resolution. The interpolated pixels are based on an average of surrounding pixels.

Digital Photography

Megapixel	A megapixel is equal to 1 million pixels. The number of megapixels is important when buying a digital camera, but must be considered alongside sensor size.
Focal Length	Focal length describes the distance between the optical centre of a lens and the image sensor, or film. A standard 50mm lens gives a view similar to the human eye, a lens with a shorter focal length provides a wider angle of view, and a lens with a longer focal length than 50mm provides a narrower angle of view and greater magnification.
Depth of Field	A camera focuses on a single point; the depth of field refers to the area around the point that is in focus. A shallow depth of field is where a narrow zone of the image appears sharp; a deep depth of field is where more of the image is sharp. A wider aperture will give a greater depth of field. Wide apertures correspond with small f numbers, whereas a small aperture is denoted by a large f number.
White balance	Different sources of light have different colour temperatures, which can affect the colours recorded when taking a photograph. A fluorescent light will add a bluish tinge to an image, and tungsten light will cast a yellowish tinge. A digital camera will have a series of 'white-balance' settings that adjust the colour according to the lighting conditions.

The most comprehensive guides on all aspects of digitisation can be found at:

<http://www.jiscdigitalmedia.ac.uk/infokits/>



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