imaging

Guidance:
Image Management Framework

ATLAS OF LIVING AUSTRALIA
sharing biodiversity knowledge

Contents

1 Introduction

1.1 About this document

This document provides guidance on developing and implementing an image management regime within a collecting institution. It provides an overview of the:

- need for image management—section 2
- image management process—section 3
- components of an image management framework—section 4
- framework development process—for both a comprehensive and minimal framework—sections 5 and 6
- developmental timings and resources—sections 7 and 8.

While the guidance is intended for use by natural history collections and institutions, we believe it is also relevant to other organisations that create, use or manage extensive collections of images.

1.2 Basis of the guidance

Guidance in this document is based on:

- accepted information management principles and practices (after all, an image is a particular type of information)
- guidance on image management issued by authorities such as the Australian National Library and the National Archives of Australia
- standard business processes within most government-funded organisations.

Where possible, supporting material has been nominated in the final section.

1.3 Using this guidance

While an institution will gain maximum benefit from implementing the whole framework given in section 4, some institutions may prefer to start with the minimal framework given in section 6. As their capabilities and resources allow, they can then progress to implement the full framework.

2 Need for image management

Images are a fundamental part of collection management; eg they:

- provide a record of the collection and its specimens
- illustrate salient aspects of species and specimens, eg characteristics
- allow the creation of virtual collections
- provide habitat context
- are an integral part of the institution's outreach program via the media and internet.

In some cases an image may represent *the* specimen, eg habitat images, or when the original specimen is out on loan.

Images are thus both a resource for scientific study and, because they were created using public funds, a public asset.

As an asset, images usually have different, and often inconsistent, characteristics. For example, an image of the same specimen may be taken:

- with different imaging technologies, eg microscope, digital camera
- at different times
- by different people
- for different purposes.

An image may also:

- be copied and replicated multiple times
- be held in multiple formats with different resolutions
- be stored in multiple locations, each potentially under the control of a different person
- be used by different people, with or without approval and attribution, and irrespective of the appropriateness of that use
- be lost
- become corrupt (digital) or otherwise unusable
- have adequate (or inadequate) metadata either embedded or stored separately
- be subject to different management regimes depending on who took it, who stores it, who manages the image store, and so on.

The only practical way to ensure images remain viable and provide value into the longer-term future is to implement an institution-wide image management regime that treats images as an asset and provides consistent, cost-effective and sustainable custodianship.

This document provides guidance on implementing such a regime.

3 Image management process

While different imaging needs exist, eg specimen identification and publication, the image management process within a natural history collection is essentially common to all images and types of specimens, as shown in Figure 1.

Some of these activities may occur many times, eg post-processing and format migration, and sharing may involve duplicating an image. In addition, an image may be resurrected from archive and used again. Thus, for an individual image, the image management process is not always, or necessarily, linear.

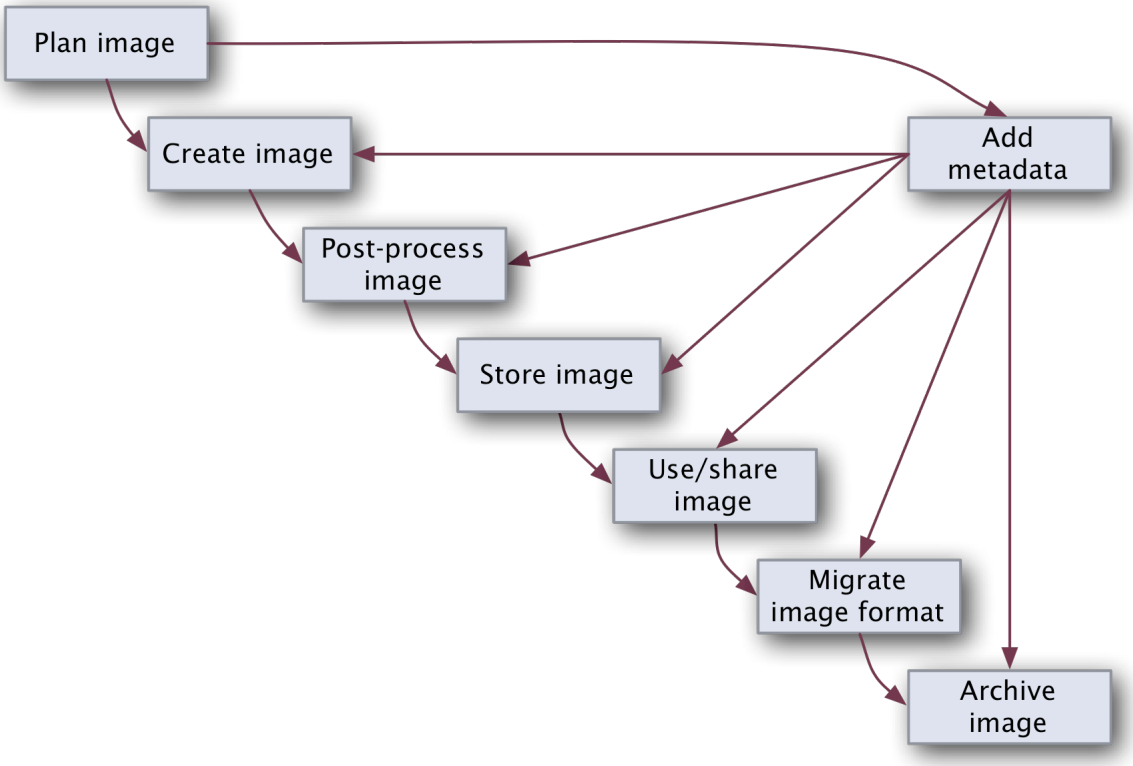

Figure 1 The image management process

3.1 Plan image

Good images do not just happen (though you can be lucky sometimes): they are created. Creating a good image takes planning and planning begins with thinking about the image you want and how you will use it.

When planning an image consider these questions:

- Who will use the image?
- How will they use it?
- What are the important parts of the image that must be clearly shown?
- What lighting should be used?
- What physical characteristics of the image are needed by the user(s), eg size, resolution, bit depth?
- Are there any special characteristics of the subject that may impact the

imaging process, eg size, preservation in liquid?

- Is the right equipment available to produce the image?
- Are the skills available to produce the image?
- How will the image be managed once it is created?

3.2 Create image

Creating an image of a specimen is not always easy, especially if the specimen is large, very small, fragile or stored in liquid.

If necessary, use, or consult with, an imaging expert to create the image.

Digital imaging is usually cheap, so there are few valid reasons for skimping on the number of images created. Poor quality or inappropriate images can be deleted during post-processing.

However, because type specimens are valuable, images of them should be of the highest possible quality.

3.3 Post-process image

Virtually every image created benefits from some form and amount of post-processing. Common post-processing actions include:

- deleting unwanted images
- cropping to remove extraneous or unnecessary content
- colour balancing to show the natural colour
- sharpening to make the image clearer
- adjusting the contrast to provide a suitable dynamic range between highlights and shadows
- adjusting the brightness to bring out salient components of a specimen
- re-sampling the image to produce derivatives, eg low quality jpg for online display or high quality tiff for paper-based publications.

3.4 Store image

Once an image has been post-processed it is stored for long-term management so that it can be discovered and used or shared.

When an image has been subject to considerable post-processing, it is not always desirable or necessary to store both it and its source image(s). Newer imaging technologies acquired over time generally provide better images so that it may be more cost-effective and practical to re-image a specimen later with newer technologies than to store an image, especially if the use of the image is trivial.

On the other hand, post-processing techniques and technologies are improving rapidly. Consequently, greater detail can often be extracted over time, so important images, eg high quality images of type specimens, should be kept indefinitely.

3.5 Use/share image

Images are used and shared in many ways, by different people, for different reasons, at different times.

How a particular image is used cannot always been foreseen; many are used in unexpected and unusual ways. This is part of the power of an image, especially digital images: uses are potentially unlimited and duplication of an image is a trivial exercise.

But the key to facilitating image use and sharing is making an image discoverable: **if an image can't be found, it can't be used**.

3.6 Migrate image format

Over time, image formats change (jpg is giving way to jpeg 2000), data media come into and out of fashion (floppy disks are now so *passé*) and imaging technologies become obsolete or obsolescent (film has almost given way to digital images).

A regular program of image maintenance and migration through formats, media and technologies, is essential to ensure the long-term survival and viability of images.

3.7 Archive image

At some point it is likely that an image is no longer current or not regularly used, and so can be archived.

Special archiving regimes apply to images, eg cold storage of film-based images, and these may be combined with image format migration regimes to provide long-term storage.

Actually, as the price of digital storage reduces each year, archiving of digital images may no longer be needed, provided image migration is regularly undertaken.

3.8 Add metadata

An image without metadata is next to useless. Metadata allows a user to know many things about an image, eg its contents, ownership, creating technology, provenance, users and physical characteristics.

Metadata may be embedded in an image or stored separately. It may be added to or revised many times over the life of an image, reflecting its different uses.

Applying adequate metadata to an image is essential to its discovery and is an integral part of image management.

4 Components of an image management framework

The imaging process illustrated in Figure 1 occurs within a context that differs from collection to collection and institution to institution. We can conceive of this variable context as the *image management framework*: the suite of arrangements, preferences, governance, capabilities and resources available in each collection or institution that affects what is imaged, how the imaging is done and what happens to the image. More formally, the image management framework, and its 10 major components, is show in Figure 2. Early components primarily involve information collection and analysis, while later components focus on documenting the framework.

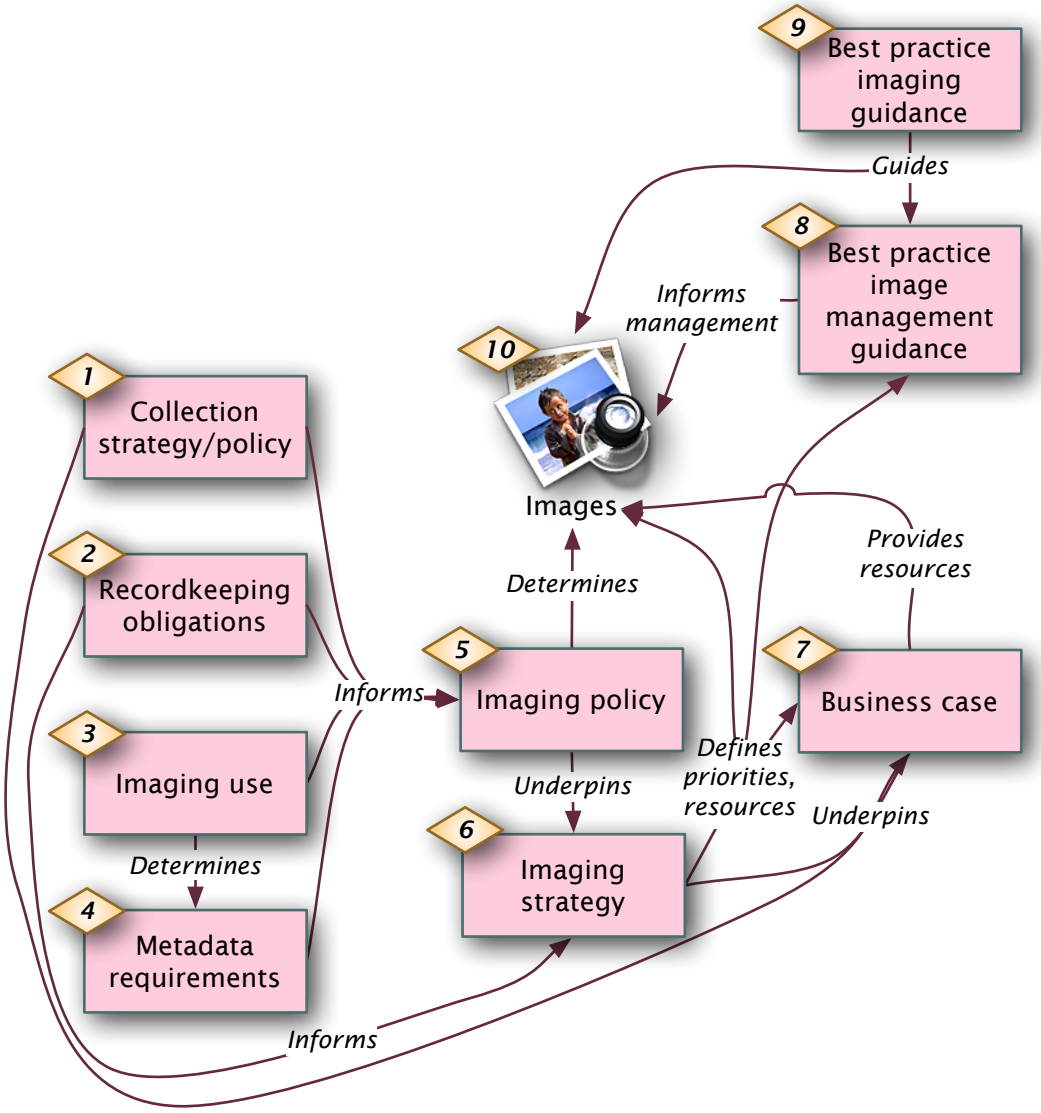

Figure 2 The 10 image management framework components

4.1 Collection strategy/policy

Each institution generally has an overall collection strategy and/or policy that defines, among other matters:

- the purpose of the collection as a whole and perhaps its component parts
- scope of the collection and its parts
- acceptable collection methods, eg field work, bequeaths, purchases
- priorities for collecting specimens
- collection management arrangements and responsibilities.

Because images are an integral part of a natural history collection they should be created and managed according to the overall collection strategy/policy. Analysis of the strategy/policy should identify issues that need to be taken into account when defining the imaging policy. And if the collection strategy/policy does not recognise the role of images within the institution's collections, it should be changed it so that it does.

Key questions

- ❏ Does the overall collection strategy/ policy cover specimen and other images?
- ❏ What are the implications of the strategy/policy for imaging and image management?

4.2 Recordkeeping obligations

Each government-controlled institution is obliged to comply with the government's recordkeeping policy. This policy will have implications for image management, eg it is likely to nominate:

- disposal requirements
- storage requirements
- archiving requirements
- custody obligations, including backup and redundancy requirements
- ownership arrangements
- metadata requirements
- public access constraints.

Non-government institutions may also have recordkeeping regimes that need to be followed.

Recordkeeping obligations must be analysed and incorporated into imaging policy and best practice guidance as necessary.

Key questions

- ❏ What are the recordkeeping obligations in relation to images and image management?
- ❏ How should they be incorporated into the imaging policy, strategy and best practice guidance?

4.3 Imaging use

Figure 3 shows the typical stages of the process of managing a specimen. Images of a specimen may be taken or used at every stage, except perhaps the collection strategy/plan.

Each stage may be performed by a different person, requiring different images, made with different equipment, generating different image formats, to satisfy the different needs of the image's different users.

Similarly, some stages may be repeated at different times, for different reasons and all may be conducted in different sequences at different times and in different institutions.

Clearly understanding which images are required for different purposes and different users is key to understanding the scope of the imaging policy and the metadata that has to be captured during, and for, use of the image.

This understanding should be documented and reflected in the imaging policy and best practice guidance.

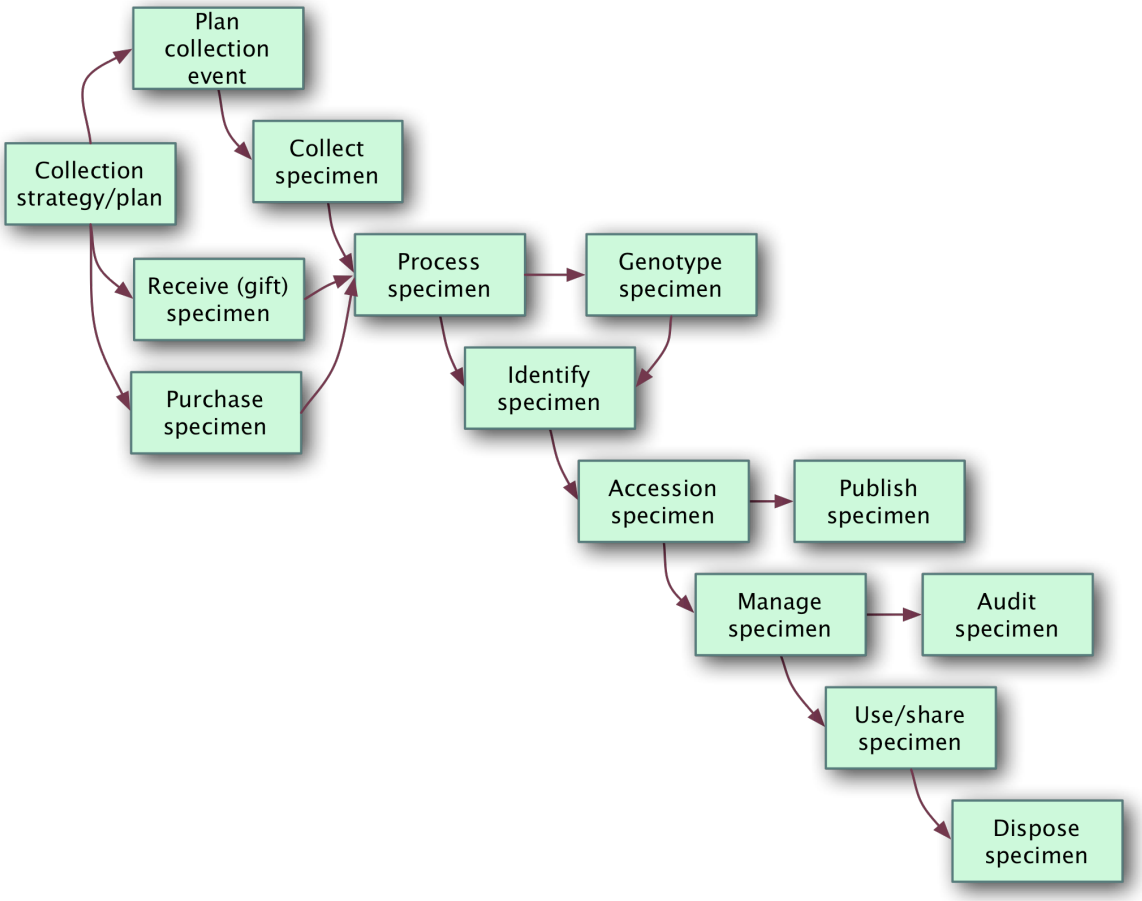

Figure 3 Imaging in the management process of a collection specimen

Key questions

- ❏ Who are the main users of the images?
- ❏ What are the nominal uses of images?
- ❏ What types of images are needed?
- ❏ What formats and resolutions are required for images?
- ❏ What metadata is required for each use and user?

4.4 Metadata requirements

Image metadata describes the features of an image and generally provides information related to:

- the characteristics of the image itself—technical metadata—eg the camera used, exposure, date/time of image; ideally this metadata will be embedded in a digital image using EXIF format (much of this metadata is added to an image automatically by the camera)
- the content or subject of the image—descriptive metadata—eg species name, habitat description, key characters shown, any special features of the image or the manner in which the image was created such as the lighting, specimen preparation
- image management—administrative metadata—eg copyright, publication details, related images.

Actual metadata will vary depending on the purpose of an image. Creation of metadata for each image is likely to be an ongoing process, with additional metadata being added throughout the life of an image and existing metadata modified or annotated.

For some institutions, the collection management software (CMS), eg Vernon, KE EMu, Specify, and/or the image management system, will also require certain image metadata.

The fundamental issue that must be resolved as part of this analysis is what metadata is required and how it is to be managed and associated with its parent image, eg embedded in an image or kept in a separate database. This issue, in turn, gives rise to the matter of how and when metadata will be created and who will do so.

Decisions on metadata should be recorded in the imaging policy and reflected in best practice guidance.

Key questions

- ❑ What metadata is required by the collection management system?
- ❑ What metadata is required by the image management system?
- ❑ What metadata is required by users?
- ❑ What metadata is required to describe the content of an image?
- ❑ What EXIF metadata is required?
- ❑ What metadata should be embedded in an image?
- ❑ Where is related metadata kept?
- ❑ Who is responsible for metadata?
- ❑ How will metadata remain associated with its image?

4.5 Imaging policy

An imaging policy sets out the 'rules' for imaging and image management that apply within an institution or collection. It should cover the whole image management process as illustrated in Figure 1 and apply across all uses of images within an institution.

While it is unlikely that policy can be developed to cater for all the nuances of imaging, the objective of the policy should be to provide clear direction about the overall creation, management and use of images. . In this way, those involved with imaging will be able to make informed decisions about their imaging activities

where these are not specifically covered by the policy.

As a generalisation, imaging policy should seek to answer the following questions:

- What is the role of imaging within the institution/ collection? (Based on the collection strategy/policy and imaging use.)
- What are the imaging objectives for the institution in the short- and long-term?
- What risks are inherent in imaging and image management and how are these to be treated?
- What metadata is to be used? How is to be managed?
- What types of imaging technologies—cameras, microscopes, software, lighting etc—are appropriate for the institution and its imaging objectives? Which ones are used? Why?
- What image formats are to be used?
- How will images be migrated from one format or media to another as new formats or media are introduced and old ones become unsupported?
- Where are images to be stored and archived, and how are they to be managed and discovered?
- What file naming conventions are to be followed?
- What recordkeeping and accountability obligations apply and how are they to be applied?
- What types of imaging are appropriate? (Based on collection strategy/policy and imaging use.)
- What special arrangements apply to different types of imaging, images, users and uses?
- What copyright and licensing, eg Creative Commons, is to be applied to images?
- What quality controls apply to images and the imaging process?
- What supplementary guidance will be produced, eg best practice imaging or image management?
- What privacy issues are related to imaging and how are these to be managed?
- Who should take images and how might volunteers be used?
- What roles and responsibilities apply?

Imaging policy should be published as part of the institution's governance document suite and reviewed regularly to ensure it remains relevant in the light of changing imaging technologies and the business context of the institution.

Key questions

- ❑ Does the policy cover all imaging within the institution?
- ❑ Is it actionable?
- ❑ Does it allow flexibility when needed?
- ❑ Does it comply with all legal obligations?
- ❑ What does the imaging strategy need to encompass to implement the policy?

4.6 Imaging strategy

Once the imaging policy is established, the challenge is to implement it. The imaging strategy sets out how the objectives and the overall policy will be achieved using the resources of the institution.

Generally, an imaging strategy would cover all necessary aspects of the image management life cycle (Figure 1). Notably, it should consider, as necessary:

- the objectives of the strategy, eg rationalise image stores, image type specimens, provide new capability
- priorities for imaging, eg type specimens, drawers, and timeframes to achieve the imaging outcomes
- priorities for image management or rationalisation and aggregation of image stores
- resources needed: people (technical, volunteer, scientific, administrative), expertise, equipment (cameras, software, computers), rooms, furniture
- acquisition plans/arrangements for any required additional resources
- training needs and arrangements
- roles and responsibilities in implementing the strategy
- risks and their proposed treatments
- budget
- monitoring and reporting arrangements.

In some situations it may be appropriate to have several imaging strategies, each having a different scope, eg image creation, image storage and management and metadata. Strategies may also cover specific timeframes to achieve nominated objectives in support of institutional goals.

The imaging strategy (or strategies) should be implemented using normal institutional arrangements.

Key questions

- ❑ Does the strategy support the policy?
- ❑ Is it comprehensive?
- ❑ Is it achievable?
- ❑ Is it actionable?
- ❑ Does it allow flexibility when needed?
- ❑ Are suitable mechanisms in place, eg resources, to implement the strategy?

4.7 Business cases

Often an institution will require additional resources to implement its imaging policy and strategy. Such additional resources will be nominated in the imaging strategy and will be justified by way of a business case. Most institutions have a standard template for business cases and these typically cover:

- project/business case objective
- justification, including alignment with strategic objectives of the institution
- scope: what's in, what's out
- deliverables
- assumptions
- constraints
- dependencies
- risks and their treatment
- resources: money, people, other
- implementation issues and arrangements
- specification of requirements
- governance arrangements.

Business cases should be progressed using standard institutional business processes.

Key questions

- ❑ Does the acquisition support the institution's strategic objectives as well as its imaging strategy and policy?
- ❑ Are the proposed benefits actually achievable?
- ❑ Are the risks suitably managed?
- ❑ Are the resource requirements reasonable?
- ❑ Are the requirements adequate, but not excessive?

4.8 Best practice image management guidance

Image management should be standardised within an institution to ensure that images remain readily available and are accorded all necessary treatments as the important resources they are.

Best practice image management guidance should cover:

- storage technologies and their uses, strengths and weaknesses
- archiving images
- migrating image formats and media
- managing metadata
- sharing images with other institutions and individuals
- procedures for using each technology held within an institution and for the different image management tasks
- roles and responsibilities in using the technologies and performing different management tasks.

Guidance should be issued in accordance with standard institutional practice.

Key questions

- ❑ Is the guidance clearly written and easily understood?
- ❑ Does it reflect recordkeeping and accountability obligations?
- ❑ Does it reflect the imaging policy?
- ❑ Does it cover all the image management technologies used?
- ❑ Does it include management of associated metadata where this is stored separately from images?

4.9 Best practice imaging guidance

Most institutions have a variety of imaging technologies and different levels of skill in producing images with the technologies. Also, some technologies are more difficult to use than others. Producing consistent quality images across all technologies and users can be considerably enhanced by adopting common and standardised imaging practices. This is especially so when introducing new technologies; how best to use the technology may be identified only after considerable trial and error.

Consistency in image creation is also important when an image is to be used by someone outside the imaging institution and especially when the image is to be used in conjunction with images produced by other institutions.

Wherever possible, an institution should adopt and promulgate common, standardised imaging practices, which may vary by type of specimen, equipment and image use. At the least, an institution should have standard operating procedures for each type of imaging technology used and for image management.

Best practice imaging guidance should cover:

- imaging technologies and their uses, strengths and weaknesses
- procedures for using each technology held within an institution
- 'standard' shots for different types of specimens for different uses
- roles and responsibilities in using the technologies.

Guidance should be issued in accordance with standard institutional practice.

Key questions

- ❏ Is the guidance clearly written and easily understood?
- ❏ Does it reflect the imaging policy?
- ❏ Does it cover all the imaging technologies used?
- ❏ Are the images produced following the guidance adequate for their intended purpose?

4.10 Images

Finally, we come to the images themselves. By developing and applying an image management framework, images should be:

- consistently of high quality
- suitable for their intended use
- readily available to all potential users
- self-describing in terms of containing or being associated with relevant metadata
- accounted for
- valued
- managed as important assets and resources.

Key questions

- ❏ What would happen if your images were destroyed or you were unable to create new images?
- ❏ Are the image users happy with the images you give them?
- ❏ How can you improve image creation and management?

5 How to develop and implement an image management framework

Ideally, in implementing this framework and institution will follow the process outlined in this section. Doing so will provide the maximum benefit to an organisation and its image management activities. However, an institution may have neither the time nor resources to conduct such a thorough process as is described. For institutions in this situation, guidance on implementing a minimal version of the framework is given in section 6.

Figure 4 shows the overall 11-stage process suggested for developing and implementing an image management framework. A single person—the image manager or coordinator—should be responsible for developing and implementing the imaging framework, though they may be supported by other staff as necessary.

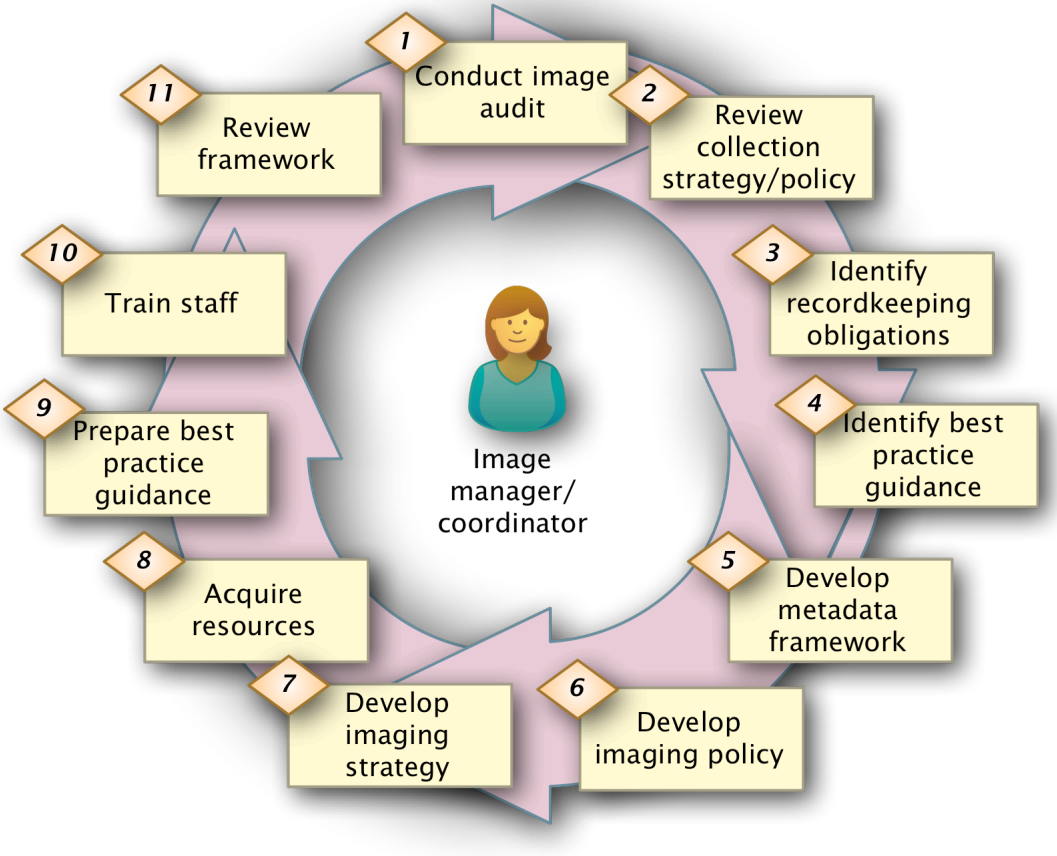

Figure 4 11-stage image management framework implementation cycle

5.1 Conduct image audit

The starting point for an imaging framework is to understand the current and preferred imaging regime within an institution. Conducting an image audit is

the vehicle for this. An image audit identifies:

- what images exist within an institution
- how images are used
- who uses them
- how images are managed
- where images are stored
- who manages the stores
- why images exist
- how they are created
- what imaging technologies are used
- who controls those technologies
- what documentation exists for imaging
- when images are created
- what metadata is available, its form and management
- what shortcomings exist in current imaging practices from the perspective of those creating, managing and using images
- what strengths exist in current imaging practices from the perspective of those creating, managing and using images
- what management expects from imaging.

5.2 Review collection strategy/policy

Review the institution's collection strategy/policy to identify any issues that need to be considered by, or included in, the imaging policy and practices. Also ensure that the collection strategy/policy recognises images as an integral part of the collection and acknowledges their contribution to the value of the collection/institution.

5.3 Identify recordkeeping obligations

Similarly, review the recordkeeping regime applying to the institution to identify any issues that need to be considered by, or included in, the imaging policy and practices. These will most likely relate to image custody and long-term management

.

5.4 Identify best practice guidance

Many institutions and organisation have issued guidance on imaging. Identify and review this guidance as it may provide ideas and even content for the imaging policy and strategy. It may also be suitable for adoption by the institution (with suitable approvals and attribution).

Note that this guidance does not necessarily have to relate to natural history collections; imaging of cultural collections, documents and other three-dimensional objects and multimedia may be just as relevant and provide ideas you can use.

5.5 Develop metadata framework

Metadata requirements strongly influence hardware and software choices, eg digital cameras should be able to generate and auto-embed the needed EXIF data and software must be able to interrogate, modify and supplement this data. If images are to be stored in an image management system, such as Morphbank,

or a collection management system like Vernon, those systems will have their own metadata needs. And your recordkeeping obligations may also impose metadata requirements.

Decide what metadata you need, how you will get it, how it will be managed and how you will implement the framework through policy, strategy and resources.

5.6 Develop imaging policy

With all this information you are now in a position to establish some rules about imaging: your imaging policy. Follow standard institutional procedures for developing this policy. Be sure to consult with image creators, image managers and image users as the policy is unlikely to succeed without the cooperation of these people. See if other institutions have imaging policies that can inform your policy.

Around this time you may also be in a position to estimate any additional resources you are likely to need to implement the policy. Now is the time to start the process of gaining these resources by including necessary funds in budgets and forward estimates in anticipation of forthcoming business cases.

5.7 Develop imaging strategy

By now you will also have identified what you need to do to implement the policy. Develop your image strategy or strategies and engage with stakeholders to ensure that the strategies are workable.

You can also update your bids for funding based on what the strategy actually entails.

Remember, a good strategy has never been let down by poor implementation; poor implementation is the consequence of a bad strategy.

5.8 Acquire resources

Most likely you will need more resources or capabilities to implement your policy and strategy. Ideally, funding for these resources will have been made available by now, but if not, now's the time to get it. If you do have the funding start the acquisition process in accordance with priorities established in the strategy and following institutional practices.

As necessary, prepare business cases and other documents required by your organisation.

5.9 Prepare best practice guidance

As resources are available prepare best practice guidance for all aspects of imaging. Or issue, with approval, guidance sourced from other institutions.

This activity is likely to be lengthy so be sure to prioritise guidance preparation in accordance with the strategy and its priorities.

5.10 Train staff

New policies, procedures and practices, like new imaging equipment, requires staff to be trained in their implementation and use. If your new imaging framework is a significant deviation from past practice, you should make the training part of a larger culture change program.

5.11 Review framework

At regular points in the implementation cycle be sure to review progress. Every so often, review the imaging framework itself; technologies change, users change, new imaging techniques are identified and these should be analysed for relevance. As appropriate, change policies, update strategies and revise guidance to ensure your imaging framework is efficient, cost-effective and adding value to your institution. It is also worthwhile updating the image audit every few years, for much the same reasons.

6 A minimal image management framework

If for any reason an institution is unable to implement the full framework outlined in sections 4 and 5 they can still significantly improve their image management through implementation of the activities outlined in this section.

Such a reduced implementation is not a substitute or alternative to implementing the whole framework; it should be undertaken as the initial iteration of an larger, more extensive program of work.

Key to the success of the minimal framework lies in implementing two key activities:

- centralising the storage of images
- providing a minimal governance regime.

These activities allow:

- suitable imaging activities to be performed using
- appropriate imaging equipment, producing images that are
- suitably managed.

As in a full implementation, having a single person or team of people dedicated to developing and implementing the framework is ideal.

6.1 Centralised storage

Key activities in introducing centralised storage for all images are shown in Figure 5.

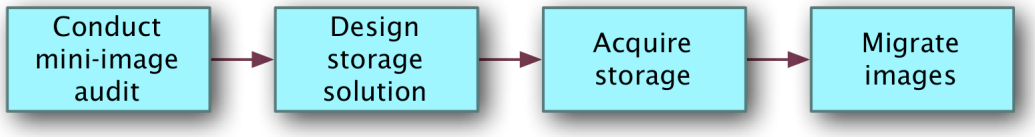

Figure 5 Key activities in introducing centralised storage for images

6.1.1 Mini-audit

An image audit should be conducted sufficient to identify all:

- image repositories, eg external hard drives, CD/DVD, C: drives, flash memory cards, content management system-based images
- image creators
- image users
- rate of image production per year
- amount of storage currently used across all repositories
- imaging equipment used in the institution
- new imaging technologies planned to be introduced and the rate at which they will produce new images.

This audit will give you sufficient information to proceed to the next activity and identify the stakeholders you will need to consult during the centralisation process.

Do not forget to consult with your IT department as they are the ones who will have to do much of the centralisation work, especially install and set up any new storage solution.

6.1.2 Design storage solution

Designing the storage solution involves considering several factors:

- the amount of storage needed, including backups
- the nature of that storage
- additional software and resources.

Amount of storage

From the audit you will know how much storage is currently used for images and the rate at which it is added to each year.

Your IT department is best placed to convert this information into the required size of the centralised store, including a healthy contingency for future images. If you are unsure about how much storage you will need in future, take an average of the storage needed for the images created over each of the past three years and triple it. That will probably provide an adequate amount for the next five years. However, if you are planning extensive new imaging initiatives, you will need to increase this measure accordingly.

Be sure to take account of backup and recordkeeping obligations. Backing up images will likely require storage several times larger than what you need to store the actual images and may also require additional hardware and software.

You may well find that the total amount of storage you need is considerably more than is currently available, so you need to buy more.

Nature of the storage

Your IT department will also help you decide an appropriate storage solution. Options include:

- centralised in-house—controlled by IT—SAN (Storage Area Network) with appropriate backup
- off-site storage provided by a vendor or other agency, eg ALA and its Morphbank store, Flickr, cloud data providers
- multiple desk-top mini-SANs, perhaps using ALA's Morphbank as a backup.

Additional software and resources

You may also find you also need to upgrade or introduce enterprise-capable image management software so that staff can load, find and access their images in the central store.

Further resources you may need include:

- metadata tools
- training of staff in any new software
- staff to migrate images
- data validation staff.

6.1.3 Acquire storage solution

Follow your institution's standard procedures for buying new equipment and obtaining any necessary additional resources. As appropriate, liaise with ALA for access to Morphbank.

6.1.4 Migrate images

While acquisition of the storage is in train, plan the migration of images from current repositories to the new store.

To a large extent the nature and extent of the migration will depend on such factors as:

- the quantity of images to be migrated
- the number of repositories to be migrated
- the nature of the new storage
- who will do the migration
- pre-migration data cleansing arrangements (it is always better to clean the data (remove duplicates, fix up metadata etc) before migration than afterwards.

Provide guidelines to image holders on what they should do, eg:

- migrate only those images that are still relevant
- remove duplicate images

- check file names; ideally these will be in a common convention defined in your governance documents.

Develop a schedule of when each repository will be migrated.

At the end of migration, remember to switch off or otherwise disable the old image repositories otherwise they will continue to be used.

6.2 Image and imaging governance

A minimal set of governance documents for imaging and image management consists of an:

- imaging policy
- imaging strategy, including imaging priorities.

Governance can be developed in parallel with image centralisation activities, if resources are adequate.

6.2.1 Imaging policy

Imaging policy should be broadly consistent with the guidance given in section 4.5. At the least, it should address:

- recordkeeping obligations
- image formats
- metadata
- image storage
- file naming conventions
- image management roles and responsibilities.

6.2.2 Imaging strategy

Again, the advice in section 4.6 should be generally followed when preparing an imaging strategy.

6.2.3 Additional governance

As resources permit, this minimal governance set can be augmented by guidance on how different types of images should be taken and managed.

7 Resources and timings

Development and implementation of a imaging framework can be done by one person or a team, depending on:

- resources available
- the scope and nature of the imaging performed within the institution
- the priority allocated to the exercise
- whether a comprehensive or minimal framework is being developed.

Table 1 provides an indicative schedule to implement a comprehensive imaging framework and is predicated on a single person working full-time to introduce a full image management regime.

Figure 6 illustrates that some activities may be conducted in parallel so that the whole exercise can be conducted within 9 months.

Figure 7 and Table 2 do the same for a minimal imaging framework.

Table 1 Implementation schedule for a comprehensive framework

Activity	Nominal timing	Comments
Conduct image audit	Up to 3 months	This will be a major exercise with lots of challenges; do not be tempted to take short cuts as they will cause more problems than you already seem to have in coming to understand imaging within your institution. Update every 5–8 years.
Review collection strategy/policy	2–3 days	Should be relatively straightforward. Additional time will be needed if you have to change the strategy/policy to recognise the value of images.
Identify recordkeeping obligations	1 week	Obligations imposed by government records offices, or legislation may or may not be adequately reflected in institutional recordkeeping regimes. Check with the relevant agencies and internal staff.
Identify best practice guidance	Ongoing, but allow several weeks	Don't be too selective at this time; you can rationalise the guidance later.
Develop metadata framework	3 months	This can be a major exercise with lots of challenges and follow-on impacts. Be prepared to 'start small' and grow your metadata as your image management sophistication grows. Maybe you will need a metadata strategy to gradually introduce more metadata.
Develop imaging policy	2–3 months	Consultation takes time but is worth it. If you can get hold of imaging policies from other organisations they can inform your policy.

Activity	Nominal timing	Comments
Develop imaging strategy/strategies	2–3 months depending on the number and nature of strategies needed	Again, consultation takes time but is worth it. Create multiple small strategies rather than one big one; they will be easier to manage and implement.
Acquire resources	As long as it normally takes in your institution; ongoing	Getting the things you need to implement your policy/strategy always takes longer than expected so allow plenty of time and start early.
Prepare best practice guidance	As long as it normally takes in your institution	Hopefully you will be able to draw on the work of other institutions and organisation. But there is still likely to be a lot you will have to develop to meet your specific needs and business processes.
Train staff	As long as it normally takes in your institution	Something else not to be skimped. Training pays dividends in terms of the cost-effectiveness of imaging, better imaging and institutional outcomes, and happier staff.
Review framework	At least every 2 years	Implementation reviews should be conducted according to the imaging strategy and other administrative arrangements.

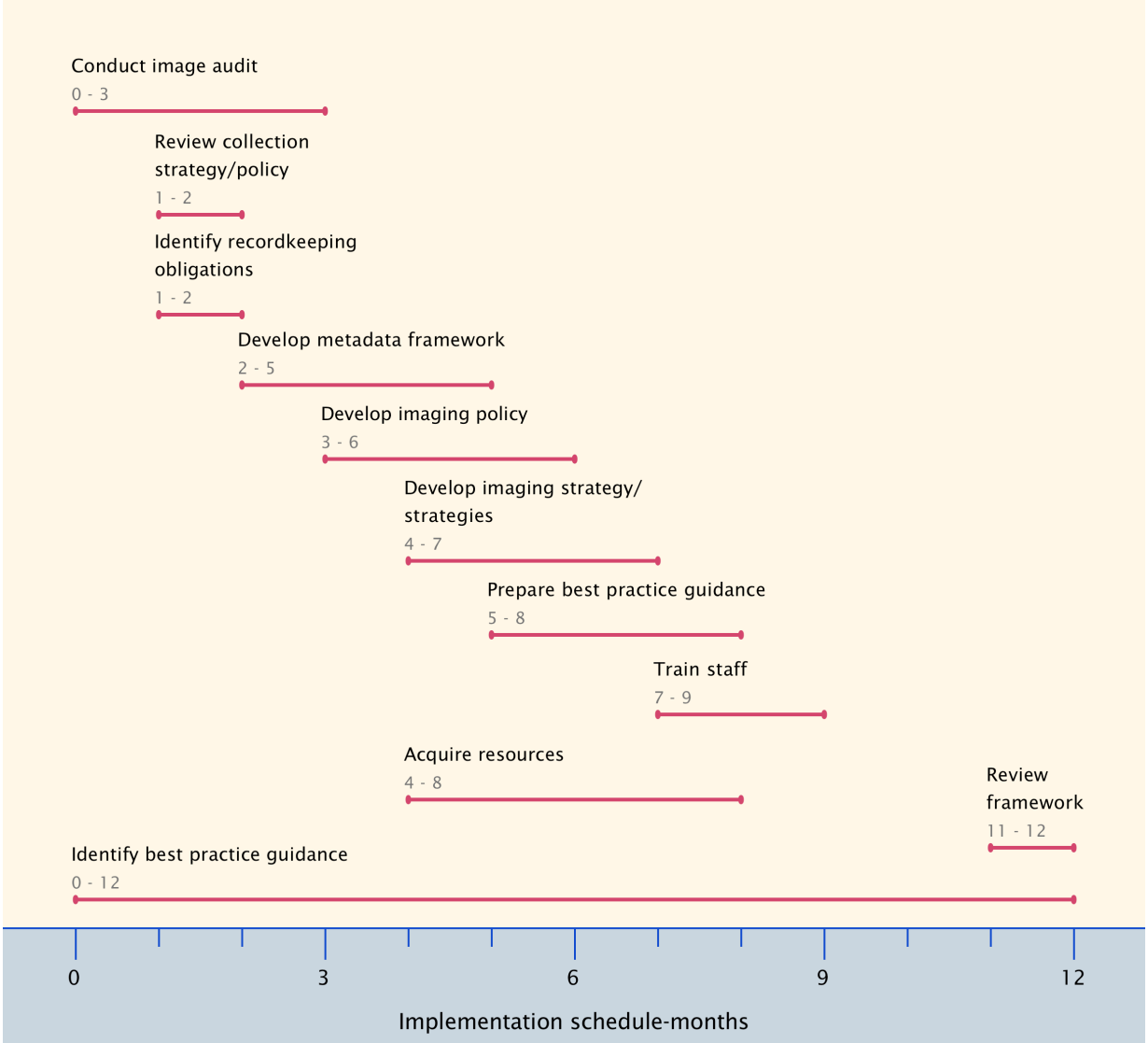

Figure 6 Implementation timings for a comprehensive framework

Table 2 Implementation schedule for a minimal framework

Activity	Nominal timing	Comments
Conduct mini image audit	Up to 1 month	Do not skimp on this audit: it is core to identifying storage needs.
Design storage solution	Up to 1 month	Consult with IT.
Acquire storage	As long as it normally takes in your institution; several months at least	

Activity	Nominal timing	Comments
Migrate images	1–2 months	Do this as quickly as possible and do not forget to turn off the previous storage. Duration depends on the number of images to be migrated. Remember to train staff on any new software acquired.
Develop imaging policy	1–2 months	Consultation takes time but is worth it. If you can get hold of imaging policies from other organisations they can inform your policy. Do not forget to include metadata.
Develop imaging strategy	1–2 months	A single strategy should be enough; just enough to get and maintain control of imaging and image management.

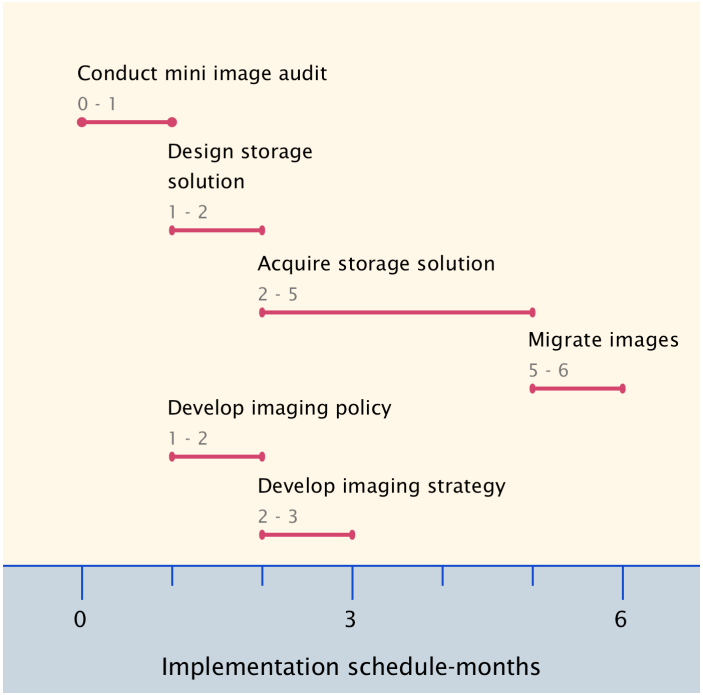

Figure 7 Implementation timings for a minimal framework

8 More information

A plethora of advice on imaging can be found on the web. While many of the following documents relate specifically to scientific imaging all are recommended starting points.

Australian Institute of Aboriginal and Torres Strait Islander Studies. *Audiovisual Archive Collection Management Policy Manual*.17 March 2009 (http://www.aiatsis.gov.au/ava/docs/AVAPolicyManual2009.pdf)

Cornell University *Moving Theory into Practice: Digital Imaging Tutorial*. (http://www.library.cornell.edu/preservation/tutorial/contents.html)

Department of Finance and Deregulation *Better Practice Checklist - 18. Digitisation of Records*. (http://www.finance.gov.au/e-government/better-practice-and-collaboration/better-practice-checklists/docs/BPC18.pdf)

Getty Museum *Introduction to imaging*. (http://getty.edu/research/publications/electronic_publications/introimages/index.html)

Global Biodiversity Information Facility (GBIF) Booklets and manuals on digitisation in biodiversity collections http://www.gbif.org/communications/resources/print-and-online-resources/download-publications/bookelets/

Hauser, CL, Steiner, A, Holstein, J and Scoble, ML (Eds) *Digital Imaging of Biological Type Specimens: A Manual of Best Practice. Results from a study of the European Network for Biodiversity Information*. Stuttgart, ENBI, 2005 (http://circa.gbif.net/Public/irc/enbi/comm/library?l=/enbi_reports/haeuser_digital/_EN_1.0_&a=d)

National Archives of Australia recordkeeping web site contains a number of guidance documents related to imaging and image management (http://naa.gov.au/records-management/index.aspx)

National Library of Australia Digital preservation site http://www.nla.gov.au/preserve/ Contains many useful digital imaging documents

National Museum of Australia *Digital preservation and digitisation policy*. POL-C-028 Version 1.0 20 August 2009 (http://www.nma.gov.au/shared/libraries/attachments/corporate_documents/policies/digital_preservation_and_digitisation_policy/files/29686/POL-C-028_Digital_preservation_1.0.pdf)

State Library of NSW *Digital practice: Guidelines for digitising images in NSW public libraries*. July 2005