FIRST NATIONS MEDIA ARCHIVES
Planning for Digitisation

FIRST NATIONS MEDIA ARCHIVES: THE BASIC PRINCIPLES

In the management of First Nations media archives Aboriginal and Torres Strait Islander knowledge and Law are the guiding principles.

Local Aboriginal and Torres Strait Islander peoples are essential cultural authorities at the centre of all decision making associated with management of the archives.

In this document

SECTION 1 DIGITISATION OVERVIEW

1. Introduction

Digitisation is a preservation action to convert media in physical form to digital files. Digitisation is an important action to ensure that the content of physical media is not lost and is available for current and future generations.

2. Preservation: the Digitisation Need

2.1 Media and player obsolescence

Viewing and listening to physical media from 2025 is likely to be impossible except for a very few items held in those specialist large institutions that are able to store physical media in low temperature and humidity conditions as well as maintain player equipment. This is due to:

1. The short "shelf-life of the media on which physical media is recorded, and
2. The increasing obsolescence of playback equipment for physical media, including lack of parts, and
3. The retirement of technicians with the required skills and knowledge to maintain and repair the playback equipment.

The Deadline 2025 document of the National Film and Sound Archive states :

> *"All tape-based formats created in the 20th century are now obsolete. Tape that is not digitised by 2025, we risk losing forever. This creates a deadline, and a dilemma, for those entrusted with the care of these precious memories. At current rates of investment in digitisation, only about 30% of magnetic tape can be saved in time, meaning tens of thousands of hours will be lost to future generations."*[1]

[1] See https://www.nfsa.gov.au/file/77021/download?token=VfcgYqmZ. Viewed September 2019.

2.2 Community access

Digitisation provides an easy way for community members to browse and locate media either online or on local computers. The provision of digitised media :

- Saves wear and tear on the physical media and players
- Enables easy self-browsing of Archive media by community members (according to cultural protocols)
- Preserves the physical media in the Archive room from being impacted by temperature /humidity fluctuations and dust entry due to entry to the Archive storage space.

3. Digitisation Challenges

3.1 Physical media playback equipment requirements

As already noted, playback equipment for physical media is becoming or has already become obsolescent. Specialist fee-for-service digitising services, and large institutions are constantly looking for second hand equipment, meaning that the market place is full of buyers and few sellers. An Archive may simply not be able to digitise the media due to lack of playback equipment.

3.2 Digitisation equipment

Specialist hardware and software is needed for the actual conversion of physical media. Support from suitably skilled technicians in setting up and configuring the equipment is highly recommended.

3.3 Skills required

Staff need training in handling, playback, digitisation interfaces and software.

3.4 Formats

Just like physical media, digital formats need to be "read**".** Digital formats can become obsolescent, or they may be proprietary with the application needed to read

and play the media becoming unavailable. It is important to standardise the formats used for digitisation to open-standards, non-proprietary formats that can be migrated into the future. Recommended formats are set out in Attachment 5.

3.5 Time taken

Digitisation is a lengthy process for both audio and video. Digitisation takes place in real-time, so a one-hour video for example will take one hour to run through the digitisation process as well as time spent in set up, checking of results, making corrections as needed, transcoding preservation masters and access copies, and storing. For each hour of video, a rule of thumb is to allow for 3 hours for all the processes involved in digitisation.

3.6 Digital storage required

Uncompressed media files take up a lot of storage. A digitisation program needs sufficient storage as well as backup, and routine checking of drives. For each hour of video, a rule of thumb is to allow 12 GBs of storage for the preservation master in DV. Better codecs will have much larger file sizes. A useful tool for determining file sizes from different codecs and resolutions can be found at https://www.digitalrebellion.com/webapps/videocalc. For more information see the *Planning for Digital Storage document.*

3.7 Digital file health

Digital files can be corrupted during download or transfer between drives and therefore can't be read. Accordingly, having cloned copies of digital preservation masters as the time of digitisation (rather than copy to backup files) can be a smart move to ensure that additional copies are available if one of the preservation masters is corrupted. Using checksums (a sequence of numbers and letters created at the time of storage of a verified file) is an essential action to ensure digital health. If a file is changed or corrupted its checksum will differ from the previous checksum. The SHA256 checksum format is recommended. For more information see the *Planning for Digital Storage document.*

3.8 Digital drive health

Digital drives fail eventually. You'll need a Planning for Digital Storage to ensure you have tools, redundancy, maintenance processes and disaster management plans in place to deal with drive failures. For more information see the *Planning for Digital Storage document.*

Your notes

SECTION 2 DEVELOPING A DIGITISATION PLAN

1. Introduction

Digitisation needs to be a well planned action rather than a "*start at "shelf 1 item 1" and work through to "Shelf ## Item #####""* approach. Digitisation is time and resource intensive. Where you have a large collection with a lot of media at risk, a digitisation plan will help with identifying priorities so that the media that is most important to the Archive and its communities will be digitised first.

2. Ways to look at prioritising

There are a number of ways to giving a prioritisation rating to any given media object . You could look at the risk of the media itself in deteriorating or consider the importance of a media object's content. What your Archive chooses to digitise is a matter for your Archive only. However, it is useful to set out some basic criteria so that an effective digitisation program can happen without wasting resources or time.

2.1 Three key criteria: Importance, Usage, Media Type

IMPORTANCE. The importance of the content of the media. Is the content of the media object significant and of value to the Archive and its communities? The cultural custodians of your Archive are important for this process. Some questions to ask about a media object are:

- Does it have cultural importance?
- Does it have language importance?
- Does it have importance for community history?
- Does it have importance for education?
- Does it have importance because of the law people in it?
- Does it have importance for the history of the media organisation?

USAGE. If the content of the media isn't all that important, or you can't assess its importance, does the current or planned usage of the media justify its digitisation. Is the media object requested a lot, sometimes, never or is likely to be in the future by:

- Community members?
- Researchers?
- Media companies wanting footage for documentaries?
- The Archive itself for usage of the media for an historical anniversary?

MEDIA TYPE. The deterioration risks of the media's recording material and carrier. Is the media particularly at risk of deterioration compared to other media? Risks for different types of media can be summarised as follows:

Audio media types	Risk level	Still image media types	Risk level	Moving Image media types	Risk level
¼" Open Reel	High	Chromogenic Colour Print	High	16mm	High
8 Track	High	Silver Gelatin DOP Print (B&W Print)	High	8mm and Super 8	High
Compact Cassette	High	Chromogenic Colour Negative	Low to High	Betacam	Medium
Compact disc (CD)	Moderate	Silver Gelatin Negative (B&W)	Low to High	Betamax	High
Continuous Loop Cartridge (Cart)	High	Colour Film Slide	High	Digital Betacam	Medium
Digital Audio Tape	High	B&W Film Slide	Low to High	DVCAM	Medium
Digital Compact Cassette	High			DVCPRO	Medium
Microcassette	High			DVD	Medium
MiniDisc (MD)	High			MiniDV	High
				Umatic	High
				VHS	Increasingly high risk of loss
				Video8/Hi8	High

2.2 Assigning a Priority Rating

The manner in which Archives apply a priority rating will vary from Archive to Archive. There is no one way or right way to implement priorities. Small Archives may choose not to assign priorities at all. However, an Archive of over 500 hours of recordings will be better placed for digitisation if a staged approach to digitisation is used.

One way of assign a digitisation priority is to allocate scores for Importance, Usage and Type. An example could look like this:

Importance	Usage	Format	Digitisation Priority if scored in either or both Importance or Usage
3 = Important for any cultural or community or historical reason	3 = Requested regularly by community members		High
2 = Important for stock footage or potential reediting in media productions, or for any other reason	2 = Needed now or in the future by the Archive's media organisation for exhibitions, presentations, etc, or for any other reason	2 = At high risk of deterioration or player obsolescence	High
		1 = At medium/ moderate risk of deterioration or player obsolescence	Medium
		0 = At low risk of deterioration or player obsolescence	Low
1 = Not important	1 = No record of being requested or needed		Not required

The interpretation of this rating method is as follows:

- Any media object that is scored a 3 in either of the Importance or Usage criteria is given a digitisation priority of High *irrespective of the media type*.
- Media objects that don't score a 3 at all but **do** score a 2 in either of the Importance or Usage criteria, are allocated a digitisation priority of High, Medium or Low *depending on the risk associated with the media type* (see 2.1 above)
- *Media objects that don't score a 3 or a 2 at all in Importance or Usage* are rated as Not Required irrespective of the media type.

Examples:

A VHS of a trip to a dam for a swim is assigned a High Digitisation Priority rating:

1 Not important

3 Regularly requested by community members

Media type is not relevant as it has scored a 3 in either of the Importance or Usage criteria

An audiocassette of bush sounds is assigned a High Digitisation Priority rating:

2 Important for production purposes

1 No record of being requested

1 At High Risk of media loss

A CD of bush sounds is assigned a Medium Digitisation Priority rating:

2 Important for production purposes

1 No record of being requested

1 At Moderate Risk of media loss

2.3 However: can you digitise it?

Before a media object is assigned a place in the digitisation queue two issues need to be addressed:

The condition the media. Is the media corrupted or damaged? If so, can you repair it yourself or does it need to be sent to specialists for repair.

The status of the media. Is the media the copyright of the Archive's organisation? If not, it's not legal to digitise it although you may seek formal permission of the publisher for this purpose.

SECTION 3 PREPARING FOR IMPLEMENTATION OF YOUR DIGITISATION PLAN

Step 1 Audit your physical media and record inventory/collection management information

Check all the physical media you have one by one, and identify the format, duration in the case of video and audio, colour characteristics, and basic identifying metadata – title, shelf order, genre, cultural access protocol[2], condition status[3].

A metadata profile to record the collected metadata is Attachment 3[4]. Further information on archive software platforms is provided in the *Archiving Platforms* document.

Note. It is important that cultural custodians are informed of the audit before it commences. Who audits and handles the media (even though at this stage there is no need to view or listen to visual/audio) is an important consideration. The media itself is a cultural object and it is vital that cultural trust is maintained in the audit process.

The inventory process may identify media objects that an Archive doesn't wish to digitise. A plan will be needed for either disposal of these items or for improved archival storage of the items [5]to reduce the deterioration risks.

STEP 1 OUTCOMES:

1. A master list in Excel of all physical media held in the Archive.

2. Identification of media objects that are not to be digitised.

3. Plan for disposing or long term Archival storage of media that is not to be digitised.

[2] Initial cultural access protocols will have been identified in your *Collection Management Plan.* You may want to review these after you have finished your audit of the physical media.
[3] Information on media handling and condition assessment is provided in the *Handling and Assessing the Condition of Physical Media document.*
[4] An Excel template is available from First Nations Media Australia
[5] Magnetic tape media is unlikely to survive no matter the storage. However, some types of photos may survive with good storage arrangements.

Step 2 Audit the Archive's playback equipment

Sort the records for the media to be digitised by media category (still image, moving image and audio (including music), and sub-sort into media type (VHS, SVHS, Betacam, Audiocassette, Colour photo print etc).

For each media type cross check to the working playback equipment you have or know that you can acquire. A template for matching the Archive's media types to playback equipment is included as Attachment 4 and is separately available from First Nations Media Australia.

Use the "*Admin-Media player available*" field in the recommended metadata profile to note whether the Archive has playback equipment for each inventoried media object.

Re-sort your records by the *Admin-Media player available*" field to give you a list of media objects that you can potentially digitise in-house. Consideration will need to be given to outsourcing digitisation of the media without playback equipment (see Step 5).

STEP 2 OUTCOME: Master list sorted into two groups – items that can be digitised in-house and items that need to be digitised by another organisation.

Step 3 Check the cultural access protocols for media objects to be digitised in-house

Sort the group of in-house digitisation records by the cultural protocols. The protocols will assist you in identifying the arrangements you'll need to make for digitisation. Items that are Restricted will need digitisation arrangements so as to restrict who can digitise and who can be in the area when the media is being digitised.

At this point you can (1) assign staff to digitisation according to the cultural restrictions and (2) plan the digitisation spaces needed for culturally restricted media. **Involvement of the cultural custodians is highly recommended during this stage.**

STEP 3 OUTCOMES:

1. In-house digitisation media objects on the master list are sorted by access protocols.

2. Digitisation staffing plan.

3. Digitisation space plan.

Step 4 Plan the sequence of digitisation of media objects for in-house digitisation

Sort the group of in-house digitisation media objects in your master list by the digitisation priority. Highlight the objects that need repair before digitisation and determine a repair approach – in-house or outsourced.

At this point it is useful to:

- Create copies of the master list for each staff member who will undertake digitisation.
- Edit the copies for each staff member to:
    - Only include the media objects for which they will be responsible.
    - Highlight the media objects that need repair.

STEP 4 OUTCOMES:

1. Individualised digitisation priority lists for digitisation staff to implement.

2. Plan for media repair.

Step 5 Plan the digitisation of media objects to be outsourced (subject to financial resourcing)

Using the master list, sort the group of media objects to be digitised by another organisation/service by the cultural access category and sub-sort by the restriction type.

In discussion with cultural custodians, plan what objects can be sent off-country for digitisation and under what circumstances that can take place.

Where cultural considerations mean that an item cannot be taken off-country, planning is needed for renting or short-term loan of the required digitisation equipment.

STEP 5 OUTCOME: Plan for off-country digitisation and short-term renting or loan of digitisation equipment .

Your notes

SECTION 4 EQUIPMENT AND WORKFLOWS

1. Equipment[6]

1.1 Audio recordings

Generic Item audio digitisation	Comments
Players	
As per the Archive audit of media	2nd hand equipment
Interfaces/digitising	
Digitising interface	For example Blackmagic Design Intensity Pro 4K-PCI.
Audio monitoring	If a separate interface to that in the capture software is preferable.
Computer	
MacPro	Need to have a box that can be opened to add different cards for digitisation
Software	
Capture software capable of capturing raw uncompressed audio	For example Adobe Audition or Media Express or Audacity
Editing software for computer OS platform	For example Adobe Audition
Encoding software	For example Adobe Audition
Checksum software	For example http://md5checksum.com/

1.2 Moving image

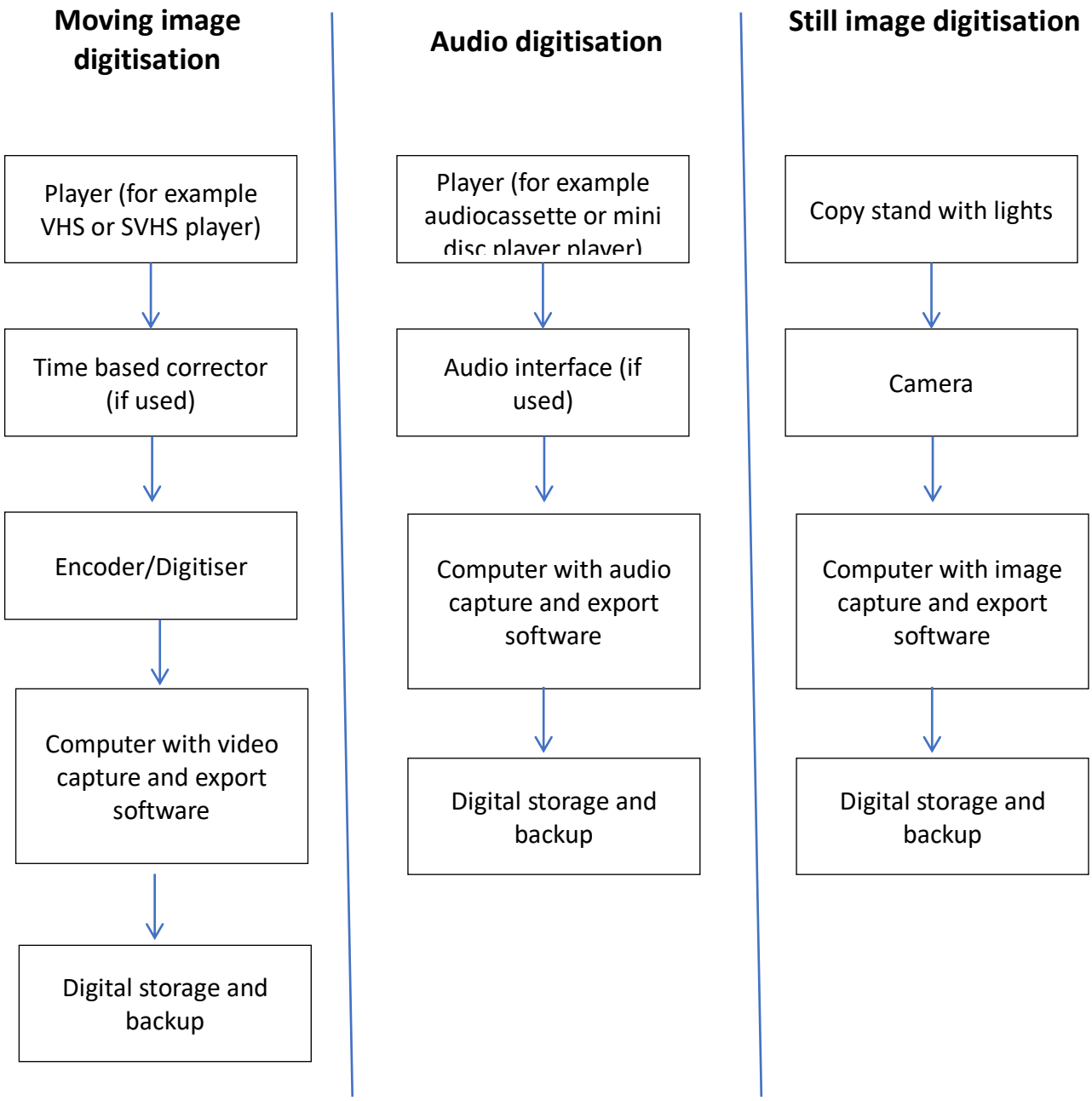
Generic Item video digitisation	Comments
Players	
As per the Archive audit of media	2nd hand equipment
Interfaces/digitising	
Time Base Corrector	For example TV One 1T-TBC
Signal quality monitoring interface	For example Blackmagic Design Ultrascope
Digitising interface	For example Blackmagic Design Intensity Pro 4K-PCI.
Computer	
MacPro	Need to have a box that can be opened to add different cards for digitisation
Software	
Capture software capable of capturing raw uncompressed video	For example Media Express
Editing software for computer OS platform	For example Adobe Premiere Pro
Encoding software	For example Adobe Media Encoder
Checksum software	For example http://md5checksum.com/

[6] The equipment and software listed here are generic examples only. Each Archive should consult with an equipment specialist to ensure that selected equipment is fir for purpose.

1.3 Still image

Generic Item still image digitisation	Comments
Capture/digitisation	
DSLR camera with best MP spec that can be afforded, zoom (range that includes 35 to 120 mm) lens, macro lens	
Remote shutter release	
White balance card	
Copy stand	For example Kaiser RS2 CP Portable Copy Stand
Daylight lighting set	For example Kaiser RB 218N HF
Lightbox for slide and negative digitisation	
OR flatbed scanner	
Computer	
Laptop computer	Mac or Windows
Software	
Editing software	For example Lightroom
Checksum software	For example http://md5checksum.com/

2. Digitisation workflow examples



ATTACHMENT 1

Digitisation Concepts

Digitise once for all purposes. This means the creation of all the preservation masters and derivatives needed by the Archive for preservation, community access and production purposes in a single digitisation "pass" of the physical media, instead of running the physical media through digitisation each time a version is required.

Preservation master(s). The uncompressed digital copy of the physical media object used for long-term storage. In Archival terms it represents as fully as possible the characteristics of the physical media object. That is, it is not reedited or corrected with colour grading for example or have subtitles added to it. It is a digital "clone" of the original physical media. The Preservation Master should exist as 3 cloned files generated at the time of digitisation, rather than two copies made from a single uncompressed file. This is to guard against the potential for data corruption when files are copied from one drive to another. The cloned files should be stored on suitable drives in 3 different locations. The Preservation Masters are not accessed for community or Archivist viewing. The drives on which they are stored need to be subject to proper management. For more information see the *Planning for Digital Storage document.*

Derivatives. Uncompressed or compressed or re-edited digital copies of the physical media. Derivatives may be:

- Uncompressed versions for re-editing for new broadcast versions or for usage as stock footage.
- **Access copies** for community viewing online or local computers

ATTACHMENT 2

Definitions

1080i (or Full High Definition (HD)). Describes a frame resolution (that is 1080 lines on screen) as well as the scan type (interlacing where a frame's even lines are "drawn" first followed by the odd lines fast enough for the human eye not to notice). 1080i is widescreen (16:9 aspect ratio).

1080p (or Full High Definition (HD)). As for 1080i but using progressive interlacing where lines are drawn in sequence.

Bit rate. Is the number of bits used per unit of playback time to the data throughput per second in continuous media such as audio or video. In general terms, the higher the bit rate, the better the quality of the media file (sound and image). Bit rate is measured in kilobits (and megabits per second). For example 25 Mbits per second.

Bit depth. Is the size an audio sample (the waveform). The bit depth sets the quality of the sound resolution for audio. Too low a bit depth means that some sound is lost with low quality recordings the result. Bit depth is also relevant to the resolution of images; the higher the bit depth the better the image.

Checksum. A sequence of letters and numbers generated by a computer function to identify the digital characteristics of a file. The sequence is used to identify errors in a file that may come about when a file is copied. By running the checksum function over the copied file, any file errors will be indicated by a checksum sequence different to that of the original file.

Codec. A codec is a computer program for encoding or decoding a digital data stream or signal. It creates the digital format and also is able to read the digital format. Codec is an abbreviation of coder and decoder. A coder encodes a data stream or a signal for transmission or storage, possibly in encrypted form, and the decoder function reverses the encoding for playback or editing. A codec can also be a device.

When a media file is edited and exported, the editing software contains codec options for creating the file in a one or more digital formats.

Digital formats (also Digital container formats or Wrapper). A digital format (or digital container format or wrapper format) describes how different elements of data and metadata exist in a computer file so that applications are able to read and display the file. Typically, the digital format of a file is described by the file extension. For example .wav indicates that the file is an audio file. This means that software such as Word cannot read or play a .wav file. When digital files are created within a specific format, editing software will generally allow for variations in how the file is configured (its settings) for elements such as frame rate (for video), bit rate, resolution and so on. Recommended formats are also included in this document at Attachment 5.

Dropped frame. Literally this means that a video frame has been dropped in digitisation for reasons such as unstable connections or lack of capacity of software or hardware to manage the bit rate of the media stream. Dropped frames result in jerky movements in the digitised file. Digitising software have settings to halt digitisation in the case of a dropped frame.

High Definition (HD). Describes video resolution. Resolution is the number of pixels in a video (or image). High Definition includes 1280 x 720, with full High Definition having 1920 x 1080 . The aspect ratio for High Definition is 16:9.

Interlacing. A technique for reducing the bandwidth needed to display video. Each frame of an interlaced video signal “draws every “even” horizontal line in one sequence and then alternates with drawing every “odd” line of an image. When this is done at around 60 frames per second, the image looks smooth. However, it can appear blurry when the video contains fast motion. **Progressive interlacing** draws every line in sequence with the result that the vision is slightly smoother.

Lossless and lossy compression. Lossless compression is a class of data compression algorithm (or codecs) that allow the original data to be perfectly

reconstructed from the compressed data. The digital formats and codecs associated with Preservation masters are lossless, and hence have very large file sizes. By contrast, lossy compression permits reconstruction only of an approximation of the original data, and therefore has reduced file sizes. The digital formats and codecs associated with derivatives are generally lossy.

PCM (Pulse Code Modulation). The process used to convert analogue audio signals (represented in waveforms) to digital signals. A PCM audio file is a digital interpretation of an analogue sound wave. **LCPM** (Linear Pulse Code Modulation) is an enhanced process for converting analogue audio signals to uncompressed digital approximating a very large set of audio values.

Standard Definition (SD). Describes video resolution. Resolution is the number of pixels in a video (or image). Standard Definition includes 352 x 240, 480 x 360, and 858 x 480 (480p). The aspect ratio for standard definition is 4:3.

Time based correction. Time base correction is a technique to reduce or eliminate errors caused by mechanical instability in analogue media players.

Attachment 3

Inventory/Collection Management Metadata Profile

Field Name	Required or Optional	Field type	Number of instances	Comment
Required fields				
Record ID	Required	Text	1	A unique identifier for the record. Can just be a running number.
Title	Required	Text	1	The title as on the media object, or a title created by the Archive.
Media type	Required	Value list	1	The actual *thing* the media object is. For example, Photograph (Colour), Negative, VHS, Audiocassette[7].
Media category	Required	Value list	1	Choose from Still Image, Moving Image, Audio recording
Media format	Required	Value list	1	Choose from Physical, Digital (Born digital), Digital (Digitised)
Cultural access	Required	Value list	1	Open or Warning or Restricted
Cultural restriction type	Required	Value list	1	If Cultural access is Restricted, select the type of restriction relevant to the Nations relevant to the Archive. For example Sorry, Mens, Womens, Sensitive
Shelf location	Required for physical media	Text	1	The Archive needs to determine a system for the way in which media objects are ordered on the shelves.
Filepath (Digital) Preservation Master	Required for digital media	Text	1	The Preservation Master is the uncompressed version of the media. It is not used for community access
Filepath (Digital) Access copy	Required for digital media	Text	1 or more	Access copies are compressed or uncompressed files used for community access or for further editing by the organisation

[7] Contact FNMA for a list that can be used with this field

Field Name	Required or Optional	Field type	Number of instances	Comment
Web location	Required for media available on the web	URL	1 or more	
Size (Duration)	Required for physical video and audio	Formatted text	1	For video or audio recordings the duration if known in the format hh:mm:ss. If not known, give the duration capacity of the tape or physical media
Size (Dimensions)	Required for physical photographs	Text	1	For photographs the size of the photograph in cm as width by length
Size (Resolution)	Required for digital photos	Text	1	For digital photographs the pixel dimensions and resolution. For example 2400px x 1500px, 300dpi
Size (File size digital)	Required for digital files	Text	1	For digital media the file size in KBs or MBs or GBs
Digital encoding format	Required for digital files	Text	1	The file format. For example .mov, jpg, wav, etc
Digitisation priority	Required for physical media	Value list	1	Used for Physical media. Values could be Required (Short term), Required (Long Term), Not required
Admin notes – Media player available	Required for physical media	Value list	1	Yes/No/Being sourced
Conservation priority	Required for physical media	Value list	1	Used for Physical media. Values could be Required (Short term), Required (Long Term), Not required
Admin notes – Repair needed before digitisation	Required for physical media	Value list	1	No/Yes (In-house)/Yes (Outsource)
Admin notes – Disposal	Required for physical media where removed from the Archive collection.	Text	1	Used for physical media that is not to be digitised. Provide notes on the reason for disposal , date of disposal and name of person authorising disposal.

Field Name	Required or Optional	Field type	Number of instances	Comment
Record created by	Required	Text	1	
Record created date	Required	Date	1	DD/MM/YYYY
Optional fields				
Content summary	Optional	Text	1	A short description of the content of media either from the media or as created by the Archive
Genre	Optional	Value list	1	Genres as identified by the Archive. For example, Bush tucker, Hunting, Law/Jukurrpa, Sports
Date made	Optional	Date	1	DD/MM/YYYY or MM/YYYY or YYYY
ICIP owner	Optional	Text	1 or more	The nation or language groups that are relevant to the Indigenous Cultural or Intellectual Property represented in the media
Copyright owner	Optional	Text	1 or more	The “western” copyright owner of the media object. For example, this may be the publisher of videos or music or the photographer
Series	Optional	Text	1 or more	If the media object is part of a series give the name of the series
People in media	Optional	Text	1 or more	Enter the names as First Name Skin/Clan/Tribal Name Last name. It may not be possible to have this information at the Inventory stage.
Place	Optional	Text	1 or more	Enter the names of places represented in the media. Use the AIATSIS Place Names Thesaurus and supplement with local names not included in that Thesaurus. It may not be possible to have this information at the Inventory stage.

Field Name	Required or Optional	Field type	Number of instances	Comment
Language	Optional	Text	1 or more	Enter the names of languages represented in the media. Use the AUSTLANG Thesaurus. It may not be possible to have this information at the Inventory stage.
Admin notes	Optional	Text	1	As needed
Checksum	Optional	Text	1 or more	For digital files

ATTACHMENT 4

Checking for media players: template

Audio type	In Archive? Yes/No	Player? Yes/No	Moving Image type	In Archive? Yes/No	Player? Yes/No
¼" Open Reel			16mm		
8 Track			8mm		
Compact Cassette			Super 8		
Compact disc (CD)			Betacam		
Continuous Loop Cartridge (Cart)			Betamax		
Digital Audio Tape			Digital Betacam		
Digital Compact Cassette			DVCAM		
Microcassette			DVCPRO		
MiniDisc (MD)			DVD		
			MiniDV		
			Umatic		
			VHS		
			Video8/Hi8		

ATTACHMENT 5

Recommended Digital Formats

Preservation masters		
Moving image	**Still images**	**Audio**
Digitised video	**Digitised images**	**Digitised audio**
Codec and settings • Codec: MPEG2 • Video Bit rate: 25 Mbits per second • Frame rate: iFrame (25Hz) • Chroma: 4:2:2 • Interlacing: Progressive • Audio type: PCM • Audio sample rate: 48kHz **Wrapper** • Quicktime (.mov)	**Codec and settings** ▪ Codec: TIFF or JPEG2000* ▪ 1:1 actual size of original ▪ Resolution: min 400 dpi ▪ Bit rate: 1 bit bitonal, 8 bit grayscale, 16 bit colour ▪ Adobe RGB (1998) Colour space for colour images; Gray gamma 2.2 colour space for B&W images. ** Please note that JPEG2000 is not the same as JPG.*	**Codec and settings** • Codec: WAV • Encoded to Linear Pulse Code Modulation (LPCM) • Sampling frequency: 96 kHz • Bit depth: 24 • Sound field: as in original recording • Byte order: Little endian **Wrapper** • Broadcast WAV (.wav).
Born digital video	**Born digital images**	**Born digital audio**
Codec and settings • Codec: MPEG2 • Video Bit rate: 50 Mbits per second • Frame rate: iFrame (25Hz) • Chroma: 4:2:2 • Interlacing: Progressive • Audio type: PCM • Audio sample rate: 48kHz **Wrapper** • Quicktime (.mov)	**Codec and settings** ▪ Codec: TIFF or JPEG2000 ▪ Resolution: min 400dpi ▪ Bit rate: 16 or 24 bit colour ○ *OR* • Uncompressed and unedited original digital image in the format set by the capture equipment. • RAW formats should be converted, without image editing, into TIFF or JPEG2000.	**Codec and settings** • Codec: WAV • Encoded to Linear Pulse Code Modulation (LPCM) • Sampling frequency: as in digital original • Bit depth: as in digital original • Sound field: as in digital original • Byte order: Little endian **Wrapper** • Broadcast WAV (.wav)

Digital access copies		
Moving image	**Still image**	**Audio**
Appropriate to the player platform(s) being used.	Appropriate to the viewer platform(s) being used.	Appropriate to the player platform(s) being used.