

Cross Media Preservation Planning

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Abstract

Audio-visual media have recorded the 20th century in way no other era has been recorded. Film, audio and video have enabled significant people and events to be witnessed by millions of people. The problem of preserving this amount of information in the original analogue formats has been monumental and despite the best efforts only a fraction of the original recordings made survive worldwide. The skills required to adequately preserve and make accessible the remaining records have been honed for only the past two decades. And now the world has moved into the digital realm.

This has engendered a new set of problems and demanded audio-visual archivists acquire a new set of skills while still requiring the original skills to manage the legacy collections. The costs required to digitise a legacy collection are largely beyond reach of all but the best resourced archive, and yet this is required if a collection is to be preserved and accessible. Consequently hard financial decisions about the way a collection is to be managed into the future need to be made by those responsible. Risk management is a crucial part of the decision making process.

Digital collection preservation requires more than the creation of digital surrogates. It is a continuum starting with ensuring the original file is intact, the development of strategies for managing the changing environment of files types and hardware evolution, and minimising the potential for loss by negligence or malicious attack.

The prioritization of collection digitization needs to take all of these factors into consideration in order to balance a collection's preservation needs with its potential for access and exploitation. Issues such as technical obsolescence, succession planning and risk analysis need to be considered along with the organization's strategic business needs such as revenue potential and key stakeholders.

This presentation will outline how the National Film and Sound Archive of Australia developed a strategy for the prioritization of all collection items in a consolidated manner that recognized efficiencies and synergies, developed new workflows, harnessed the potential of new technologies, addressed at risk priorities and provided for long term planning.

Cross Media Preservation Planning

Background

The National Film and Sound Archive of Australia (NFSA) has a mission to:

"...excite people's curiosity and inspire their creativity through development, preservation and an informed understanding of Australian film, sound and emerging new media heritage, its cultural diversity and significance." [1]

Key to this mission is ensuring that the collection, which contains over 1.9 million objects, is preserved and made

accessible. Balancing the NFSA's resources with these expectations requires a strategic approach to preservation that focuses on risk and that satisfied immediate access demands while also providing a basis for future development of organisational capabilities and infrastructure

Audiovisual objects start to deteriorate from the moment they are created. *Preventative conservation* [2] is the cornerstone of NFSA's preservation efforts to address this deterioration. The rate of decomposition of an object is affected by the manner in which it has been manufactured, stored and handled, but eventually all audiovisual objects, such as cinema release prints, videotapes and wax cylinders, become fragile and unsuitable for archival purposes.

As a result, preventative conservation cannot form the entirety of an audiovisual preservation effort. While not necessarily a unique notion, an audiovisual object must be considered to consist of two components - *content* (the information), and *carrier* (the physical object). For this part of the discussion reference is only being made to objects with a physical carrier that is intrinsic to the format and the playback technology informs part of the experience of the work, e.g. a motion picture film or audio tape. "Born digital" objects that have no intrinsic carrier are treated as simply content, although an argument may be made regarding the characteristics of the original and subsequent file formats as forming part of the work. Preservation may likewise be considered as being required for both of these components either individually or in tandem. Although it is impossible for archivists to guarantee the permanent availability of objects, the content from those objects may conceivably be preserved forever. Therefore in many instances there is no other option but to separate the content from the carrier for effective preservation.

Preservation is a somewhat misunderstood expression. The goal of preservation used in the context of audiovisual archiving is: *"to ensure permanent accessibility"* [3]. The inclusion of access within the definition provides an additional dimension. Providing access from the original carrier carries an unacceptable risk of damage or loss. Therefore a preservation strategy must include the provision of access in a manner that ensures the safety of the original object and that maximizes the collection's relevance to its audience. This naturally increases the cost and complexity of the preservation task

It is widely assumed that once an object is preserved no further action is required, this is erroneous. Audiovisual preservation is an ongoing cycle of actions. Increasingly these cycles are driven by technologies that have shorter life expectancies. Preservation planning must therefore have the vision and flexibility to deal with future conditions and requirements

Collection analysis and risk identification

The NFSA is responsible for the national collection of audiovisual heritage. Within this broad collection there is a wide

range of physical and virtual objects. The collection is divided into 3 populations based on media, i.e. moving image, recorded sound, documents and artifacts.

Within each population there are a variety of materials and subsequent risks. For example the moving image population contains motion picture film, video tape, data tape, optical discs and portable storage devices. If the population is further analyzed for just motion picture film and one characteristic e.g. the substrate, the population can be divided into:

- cellulose nitrate
- cellulose “di”-acetate
- cellulose acetate propionate
- cellulose “tri”-acetate
- polyethylene terephthalate

Delving further, each substrate may use black and white or color final image forming materials, and these image materials may be further divided e.g. for color - a range of dyes (Technicolor and similar processes), substantive or non-substantive chromogenic processes, etc.

Each of these populations has particular risks or combinations of risks to be managed. For film these are largely related to chemical decomposition. Again using film as an example Table 1 lists potential specific risks for an individual object within the collection:

Table 1: single object risk matrix

Characteristic		Risks
Format	16mm	Support waning due to uptake of HD video production.
Date of production	1965	Poor storage environments exacerbating chemical decomposition.
Substrate	Cellulose triacetate	polymer is susceptible to acid catalyzed hydrolysis, i.e. “vinegar syndrome”.
Emulsion type	Original negative	Non-human readable, references to the original image density and color balance
Image forming material	Chromogenic dyes	ECN process era, known to be unstable and highly susceptible to fading.

Most objects contained within the collection face not only chemical deterioration but also technological obsolescence. For example, 2” videotape was a very popular format and due to the longevity of the format (in Australia 1956 to the 1980s) there are thousands of hours of unique content recorded on these tapes. The tapes are susceptible to several forms of chemical decomposition, which may be largely managed by good storage and conservation treatments. However, the risks to this format are enhanced by the rarity of fully operational playback equipment, spare parts *and*

people who know how to transfer the optimum signal and keep the equipment operational. In many cases it is these additional obsolescence risk factors that pose the greatest risk to the preservation of an object.

The NFSA has assigned a risk management team to develop an understanding of all the risks and priorities associated with each type of object and to work on continuously prioritizing these objects for duplication or conservation.

This team uses a risk matrix to examine risks within specific collection sectors. The matrix takes into consideration technological support, fragility, the anticipated useable life expectancy of an object and how well a particular work or record is represented within the collection. For example an early audio recording may be the only extant copy.

Table 2: example risk matrix for 2” video tape

Obsolescence	Fragility	Life Expectancy	Holdings
Can buy	Hardy medium	>200 years	Many high quality copies
Soon to be obsolete	Needs caution	50-100	Some high quality copies
Just finished (<2 years)	Breakable	20-50	Some copies
Not standard (<5 years)	Very fragile	5-20	No high quality copies
Obsolete	Treat as glass	1-5	No copies

From this data the collection database may be interrogated for all objects that are identified as an object or format that is under risk and levels of priority can be assigned to each. This satisfies the technological approach to risk management.

Digital issues

The majority of audiovisual production is now partly or wholly digital. Traditional preservation risks are further increased when they involve digital objects and digital systems. Not only are the risks of obsolescence ubiquitous but also in many cases archivists are faced with the unusual task of duplicating content to a medium that has an even shorter lifespan than the original material. In addition, errors can be introduced at many stages of the acquisition or management of the files.

Digital collection management is a continuum that begins with verifying that the original file is intact and continues with the development of quality checking procedures, strategies for managing the evolution of file types and hardware, minimizing the potential for loss by negligence or malicious attack and reducing the impact of catastrophic disasters on a regional scale.

At an early stage of NFSA’s development of acquiring born digital content the importance of end to end risk management of files was clearly demonstrated.

A number of digital video files of a popular television show arrived on removable media for ingestion. Simple Cycle Redundancy Checks showed no errors. However, during quality checking an artifact was found. At this stage NFSA was not applying checksums, however investigation into this problem indicated that there was system-induced error. From this point onwards checksums were integrated into the digital workflow. The source of the error was traced to a faulty cable in the transfer from the removable device and the ingestion station.

It should be noted that rapid format obsolescence is not just a modern phenomenon. Many formats faced format obsolescence in the late 1890s and early 20th century, and archives faced major challenges with audio formats in the 1950s and 60s, and analogue video formats in the 1970s and 80s. Although data storage systems will continue to evolve, at least the copying and checking process may now be automated with limited generational loss.

In fact, the most significant challenge with newer content, such as multi-platform and transmedia content, is its interactive or non-linear potential. This content can require scripts or applications to run in a large number of different instances, often on devices with very limited lifespans. Not only does this provide creators with a choice of formats for the different audio, video, text and graphical content, creators can also choose from different operating systems, plug-ins and software that control behaviors, and incorporates user input. This results in objects with complex structures and relationships that must be preserved. The latest applications often have collaborators rather than audiences, so every experience of that content is a different performance or event that is difficult to capture in a form that can be preserved.

There are no easy answers for the preservation of dynamic media and a combination of migration and operating environment emulation is currently the best way forwards. Archives may also consider capturing a user's experience of this media through screen capture software or by filming a user's experience.

Curatorial approach to prioritization

The NFSA's preservation prioritization process is not solely driven by the technical risks to the collection. The organization operates under a curatorial model that uses a range of criteria to assess significance for acquisition, preservation and access [4].

Table 3: curatorial prioritization matrix

Criterion	Definition
Historical	A work or body of work which documents or is associated with a particular individual, place, event, genre and movement.
Aesthetic	The intrinsic artistic value, excellence or innovation within the work. This can include the reflection of broader aesthetic trends and influences, including the merging of creative and technological elements within a work.
Scientific/ Research/ Technical	A work or body of work that represents excellence and innovation in relevant technical execution or production or supports research on an important, rare or endangered aspect of Australia's cultural or natural heritage.

Cultural/ Social/ Spiritual	A work or body of work which meaningfully reflects social, spiritual or cultural bonds of community, belief, values and religion.
Provenance	The origin, ownership history and context of a work.

To assist in making fine determinations on priorities, a set of comparative criteria have also been developed.

Table 4: comparative determination matrix

Criterion	Definition
Representativeness	How a work embodies the characteristics of a particular style, movement, genre, period, movement etc.
Rarity	Rare or uncommon works of relevance to the NFSA's collecting activities.
Condition/ completeness/ intactness/integrity	The degree to which a work is complete in terms of both physical form and creative content.
Interpretive potential	The potential of a work or a body of work to tell a meaningful story in terms of the NFSA's mission, audiovisual archival and broader historical themes.

Resource analysis

The NFSA is one of the few audiovisual archives that has specialized media laboratories that can provide preservation services such as duplication or transfer of content for the majority of the formats found in the collection. However, due to the high cost of staffing and maintaining specialized facilities, the actual number of objects that may be processed by each laboratory in a reporting period, i.e. a financial year, is limited. As a result, defined targets have been developed that take into consideration issues such as preparation and conservation times, machine speeds, maintenance schedules and quality control. The last point is of particular importance to the NFSA and strict quality standards for transfers are maintained.

A clear understanding of all the inputs into a workflow for preservation of a specific format is required to determine costs and capacity. Even a simple action may have a workflow containing many tasks requiring scheduling and cumulative significant resource implications. Even ongoing preservation actions/cycles have significant resource implications, especially in the scale of the storage requirements for moving image files.

Implementation

The known capacity of the resource for each broad population, i.e. moving image, recorded sound and documents and artifacts; is included in prioritization activities along with the risk prioritization and the curatorial significance criteria to create a known quantity of work that has been thoroughly prioritized.

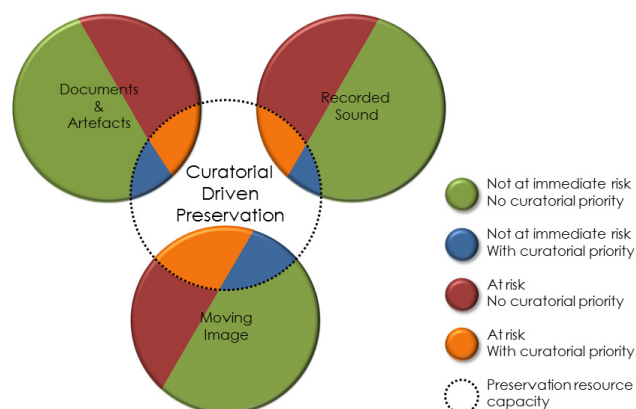


Figure 1: representation of the Cross Media Preservation Plan

As noted, the definition used for audiovisual preservation includes a strong reference to access. Applying the curatorial model across the different collection populations enhances a users' ability to interpret works that represent the breadth of the collection. This is best demonstrated by using a typical example from the collection, shown in Table 5, which demonstrates how different elements of a Title or theme can be preserved concurrently to maximize the audience impact of preservation work.

Table 5: Cross media outcomes for a discrete title

Collection population	Collection objects
Moving image	Original negatives
	Cinema release print
	Television interviews
Recorded sound	Radio interviews
	Oral histories
Documents and artifacts	Original scripts with annotations
	Production stills
	Scrapbook/clippings
	Awards

Conclusion

The NFSA's cross media preservation planning approach delivers a road map for the organization to prioritize and plan preservation activities for all media in a consolidated manner that:

- brings together curatorial guidance in a way that recognises efficiencies and synergies
- addresses at risk priorities; and, provides for long term planning for significant events and/or anniversaries
- allows for long term project planning of NFSA's Preservation staffing and resources
- improves the potential for the breadth of the NFSA's collection to be reflected in all preservation and access programs
- ensures that preservation targets are met and that these are balanced with NFSA's resources and quality guidelines
- allows stakeholders to build and share knowledge about Australian audiovisual heritage, emerging new media, audiovisual cultural diversity and significance' through access to a larger part of the collection.

References

- [1] National Film and Sound Archive of Australia, "Corporate Plan", p3
- [2] R Alcántara, "Standards in Preventative Conservation: Meanings and Applications", ICCROM, 2002
- [3] R. Edmondson, "Audiovisual Archiving: Philosophy and Principles 2nd Ed", UNESCO, 2004, p 19
- [4] NFSA "Statement of Significance", 2010

Author Biography

Rod Butler has worked at the NFSA for more than 20 years in a range of access, digital management, conservation, and preservation roles. Currently he is the head of the Preservation and Technical Services Branch which preserves the NFSA's audiovisual collection through duplication and conservation services. Rod has a strong focus on developing workflows that maximise the NFSA's ability to deliver prioritised, balanced and high quality preservation and access outcomes, and has delivered presentations and workshops on this topic at a number of international conferences.