Implementing the Achievable:
Storage, Prioritisation, Disaster Planning

Mick Newnham: ScreenSound Australia – the National Screen and Sound Archive

Introduction

Audio-visual media archiving is a very expensive business. Not only are collections usually quite large, but the materials from which the objects are made tend to be quite unstable, even over a short time frame, and require specific storage conditions.

Often the individual objects are unique and may represent the only record of a significant event or person in a countries heritage. This creates a dilemma. How do we preserve such an object so that it is available for future generations to interpret? Especially given the difficulties our region faces with a harsh climate and generally low levels of resources available.

Unfortunately there is no simple, low cost way to completely ensure an object's survival. However we can optimise our existing resources to provide the most secure environment for these national treasures.

I will look at the three headings- Storage, Prioritisation and Disaster Planning - and try to see if there are ways we can be more effective in utilising our existing resources in this area.

Storage

Most of us are very aware that AV-media objects require specialised storage of low temperature and low relative humidity. These conditions reduce the rate of chemical deterioration of the various components such as the film base, image forming materials, magnetic binders etc. Good storage is a cost effective way of maximising an objects life expectancy and the corner stone of most strategic preservation policies.

Temperature provides the energy to drive the reactions and water, as relative humidity, provides a reactant. Reduce the amount of both of these factors present in the environment and the deterioration reactions will slow down. Unfortunately reducing temperature and relative humidity requires specialised equipment with ongoing maintenance and energy costs. Examining the way a vault is constructed may allow us to discover inexpensive methods of improving the efficiency of our vaults or reducing the impact of poor storage conditions on the objects in the collection.

Vault building fabric

Most vaults are built from porous materials that offer little protection from water vapour. We must realise from the outset that water as vapour has a tremendous potential to equalise the pressure exerted by the environment. When we consider a vault and the conditions we want inside, known as a *microclimate*, we need to consider how the vault microclimate will be affected by the larger *macroclimate* outside the building. So a first point we can consider is ways to improve the moisture barrier or membrane around the vaults.

Ideally a vapour proof membrane should be installed when the vaults are constructed. Unless an organisation is fortunate enough to be able to build a purpose built facility we have to deal with existing buildings. Most paints will only provide a short term barrier, eventually water will find its way through by literally pushing the paint apart blistering the paint away from the walls, floor etc. More complex coatings are available that range from two part coatings, urethanes and tar based products. Great care needs to be taken when choosing a sealant, as many of these products release compounds that may harm collection objects. A two step approach may be required:

1. seal the floors and walls etc with the sealant
2. cover the sealant with a second inert barrier to restrict off gassing of harmful compounds.

A slightly more complex, and thus expensive, approach would be to build a secondary wall within an existing building. A proper membrane could be installed between the inner and outer walls. The complexity of construction could range from a simple frame that holds a membrane of vapour barrier and an elevated floor; to the construction of a cool/cold room.

Once isolated from the external macroclimate, control of the microclimate can become more energy efficient as well as providing better storage for the collection.

Temperature control can be similarly improved by the addition of thermal insulation to an existing building. It is certainly simpler to thermally insulate an existing building than to add a vapour barrier. And this, although well intentioned, may lead to a problem if no steps are taken to improve relative humidity control.

Relative humidity (%RH) is the relationship between the amount of water held in the atmosphere and the maximum amount of water the atmosphere can potentially hold - at saturation point – at a given temperature. Higher temperature atmospheres can hold more water than cooler atmospheres. Thus at a fixed atmospheric moisture content the relative humidity of cooler air will be higher than that of warm air. By just lowering the temperature of the vault the %RH can rise as moisture becomes available either through the porous wall or by the wall acting as a water reservoir. If the %RH rises and stays above 60% then mould will become a problem. Care therefore needs to be taken in how any improvements are made, as it is possible to imbalance a system.

Other microclimate controls
So far we have looked at the vault microclimate. It is possible to go into even more detail and examine what could be done on an individual object level.

The Kodak Molecular Sieve Acid Scavenger has been much publicised as a method of controlling the acid level in films. One of the less publicised features of Molecular Sieves is that of a very powerful desiccant that will maintain a low %RH condition inside an enclosure. There are many locally available desiccants based on phyllosilicate clays such as montmorillonite (calcium aluminium silicate). There are large deposits of suitable clays in regions such as northern Vietnam and southern China and a thriving industry in the preparation of low cost desiccants. These may be a relatively inexpensive method of providing a suitable enclosure level microclimate control in smaller collections.

However with this type of climate control care needs to be taken with the packaging to ensure that the desiccant does not contaminate the object or that the packaging does not off-gas any harmful compounds.

If this type of microclimate RH control is used less effort is needed in maintaining a low %RH in the vault and less expensive types of air conditioning may be used.

Pollutants
AV-media objects may be adversely affected by atmospheric pollutants such as acids and other oxidising agents. Vaults should have some method of filtering, or diluting, pollutants from the atmosphere. Carbon filters are a common approach but may be expensive to install and require regular replacement. There are a variety of other adsorbents on the market but these also tend to have high initial installation and running costs.

What is needed is a low cost method of reducing the build up of pollutant gases, many of which are generated by the collection itself e.g. acetic acid from film base deterioration.

A rapid and total air change will flush the built up pollutants from the vault with only a minimal change in the vault microclimate. Given that most AV-media objects are

very slow to equilibrate to, even large, changes in RH, a short period of high %RH will not have a significant affect on the chemical stability of the objects. There is also a fairly large thermal mass in most vaults, so a brief temperature excursion will be fairly rapid to recover.

Pest Management and Vault Hygiene
There are many factors that can affect the long term survival of AV-media, larger biological pests are a risk that can be controlled by good vault hygiene.

By clearing vegetation or rubbish from around the outside of a vault, and regular cleaning of the vault, destroys the habitat of larger pests. Ensuring that all pest entry points into the vaults are blocked will further reduce the likelihood of an infestation. These entry points also allow for the ingression of water, properly sealing these areas therefore serves a double benefit.

Regular cleaning of the vault prevents a build up dust that may contain contaminants or at the very least cause physical damage to the item when it is played back or projected.

Time out of storage
The amount of time an AV-media object spends out of storage will have a significant affect on the long term life expectancy of the individual object. Even a week out of storage can have a dramatic affect on the stability of an object, especially if the out of storage conditions are high temperature and relative humidity. This does not imply denying access to the object, rather ensuring that the length of time out of storage is monitored and possibly some restraints such as an absolute time limit for the period of access. If a particular title is regularly requested this makes a strong case for duplication, at least to provide an access copy.

Prioritisation
All collections have a few prized items that are of high significance. While a view of a countries culture or history is best interpreted from a range of sources, some items stand out as prime examples.

The only fairly recent widespread awareness of the relative instability of AV-media objects has meant that many early recordings have already been lost and those remaining may be in a very poor condition. This in turn increases the importance of the remaining objects, but age alone is not necessarily the determining factor in the value of an object to a nation.

As an example Australia has a film tradition that extends back into the late 19th century, and certainly many important films such as the signing of the Federation documents in 1901 date from this era. But there are other, perhaps less obvious films, that have had a major shaping effect on Australia. The original "Crocodile Dundee" (1986), despite whatever may be thought of it as a film, was highly profitable, helped a resurgence in the Australian film industry and raised Australia's profile internationally, especially in the United States. This in turn generated a great deal of interest in Australian products and Australia as a tourist destination. It would be hard to measure the ultimate value of this film to Australia.

The loss of many treasures from the past and the increasing domination of many forms of media by the United States and other English speaking countries, often means that there are few opportunities for a collection to develop a comprehensive representation of a nation's culture. Everything tends to be accepted into a collection regardless of its condition or how significant the content maybe. This is the point at which prioritisation should take place.

It is beyond the scope of this paper to describe a procedure to determine the heritage value of an AV-media object. However prioritisation of the collection in this

way enables the most important objects to be readily identified when planning processes are underway.
Planning may be:

- developing a duplicating priority list where heritage value and condition can be used to create a matrix to best use the available money.
- determining the optimum conditions for storage vaults, if the majority of high heritage objects can tolerate higher temperatures then a less expensive operating conditions can be used.

If only limited controlled storage is available the most significant objects in the collection can be placed here in a descending order of priority until all the available space is use

Once priorities have been assigned across the collection, access policies can be designed to minimise the length of time high value objects are placed at risk by time out of storage considerations. For example a high heritage object may only be able to be loaned for a maximum period of one week, or it may only be loaned to an organisation that can demonstrate adequate care and storage will be provided for the whole length of the access period. Again this is not a denial of access but rather extending the care of the object beyond the walls of the organisation. This also encourages a general feeling of the worth of the collection amongst users.

Most importantly prioritisation ensures that a collection's intrinsic worth is less compromised in the event of a disaster. Recovery operations can target the most valuable objects and treat these first ensuring the most significant collection objects survive beyond the disaster.

Disaster Planning
Disasters can occur to AV materials collections as a result of short term or long term factors.

Short term factors involve the more commonly thought of disasters such as flood, fire and severe damage or destruction of the storage vaults (e.g. earthquake, volcanic activity or typhoon/cyclone).

Long term factors can include extended periods of storage where:

- the relative humidity is high, especially when it is greater than 60% for extended periods
- storage temperatures are constantly or frequently high or often fluctuate over a short period of time.
- vermin are uncontrolled
- high levels of oxidising agents or other pollutants are found

Planning for dealing with short term and long term disasters is an essential part of collection management. This is not a glamour part of the job of AV-media archiving, in fact it is hoped that the plan will never need to be used.

Elements of a disaster plan need to look at the risks that face the collection:

- Collection size and dispersion
- Collection condition
- Building and Building Services
- Location risks
- Support options
- Internal organisation

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Collection Size and Dispersion
Investigating how many objects you have to deal with and the types of objects, e.g. videotapes, films or audiotapes, will give some idea of the resources necessary to deal with a range of disasters. Likewise being aware of where the various collection objects are stored ensures that nothing will be forgotten if a recovery program is undertaken.

Collection Condition
Condition reporting provides a benchmark for assessing how the various storage conditions and access policies are affecting the long term survival potential of the collection objects. By regularly re-surveying the collection an accurate picture on the rate of both chemical and physical deterioration can be obtained.

As part of the disaster planning any records of the collection must also be considered.

Building and Building Services
The durability of the building in the event of a high impact disaster such as a tropical storm or fire and the reliability of the building services e.g. water & electricity, will indicate the potential magnitude of the disaster. Understanding the sorts of resources that may be necessary after a major disaster, and with some interpretation of the effect of previous disasters in the local area, will allow some stockpiling of essential equipment. For example if flooding is common and electricity supplies are known to be interrupted then a small independent generator to power a pump and emergency lighting can be planned for.

Location risks
Some locations are more inherently risky than others and the type of risk can be easily assessed. Low lying areas near rivers are far more prone to flooding than hill tops. Some risks are perhaps less obvious. A storage vault located in an industrial area will be impacted by a higher level of pollutant gases than a vault located in a more rural setting, and will have a higher potential for fire. Even within a building, adjacent rooms can present a risk. Service areas such as boiler rooms or electrical switchboxes are potential sources of heat or fire and their proximity needs to be considered.

Support options
No archive could afford to purchase and maintain all the necessary equipment to deal with a disaster. But there may be commercial leasing companies that have the necessary equipment. Before a disaster a list of suppliers of ***all*** the essential equipment should be prepared. If it is possible an agreement with regard to the type of equipment, the number of units required and an agreed hire cost should be made.

Internal organisation
The best plan is useless unless there is the organisational support to implement it. The following areas need to be clearly defined:

- Areas of responsibility, who is responsible for what.
- Staff training in procedures and reporting, this must be regularly reviewed as circumstances change.
- A hierarchy developed so that if a key person is unavailable the next on the list has the necessary level of responsibility to make important decisions.
- A source of funding for the recovery operation needs to be available so the recovery can start immediately.

Clear and open communication is essential. Everyone needs to know who is responsible for what and regular reports on progress must be made so the project is well co-ordinated and effective.

To recover a collection rapid response is required to at least stabilise the objects, remembering not all objects are stabilised in the same way. And finally and most

importantly a recovery operation must be safe! No one should enter a vault until it is guaranteed that the area is safe. This means:

- no live electricity cables
- no unsupported structures
- no toxic gases or other toxic substances.

Summary
AV media collections are expensive to maintain but are an irreplaceable source of information about a countries heritage.

Incremental improvements in storage conditions can be made to an existing storage facility, but these improvements must be made in balance.

Access policies that consider the time out of storage impact on the chemical stability of an object can help lengthen an objects life expectancy.

Prioritisation of the value of individual objects within a collection is vital for effective planning purposes and especially disaster planning.

Disaster planning provides insurance for the heritage value of a collection in the event of a disaster.

Effective disaster plans not only include the technical details on treatments but must also include operational details such as responsibilities and training.

Improving the life expectancy of objects within a collection need not necessarily involve high expenditure. Often simple changes in work practices or revising policies can extend the potential life expectancy of each object with little monetary cost.