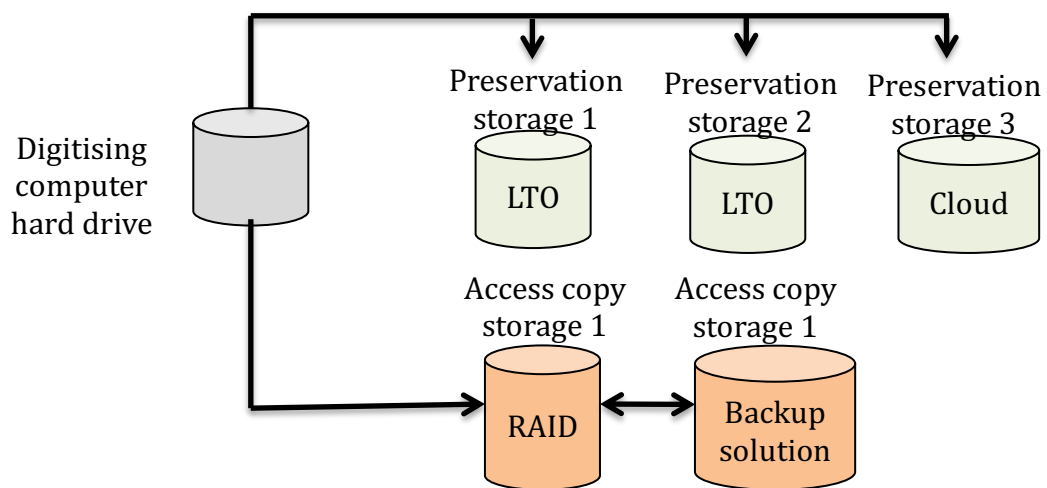




Developing, Caring For And Digitising ATSI Audiovisual Collections

Digital Storage Options




Example only. Organisations should determine their own storage mix after independent research.

Storage			
Storage Option	Description	Comments	Recommended
Hard drive in a computer		<ul style="list-style-type: none"> • Does not allow for sufficient expansion. • Dust prone. 	No
Server	<ul style="list-style-type: none"> • Multiple hard disk drives of varying storage capacity. 	<ul style="list-style-type: none"> • Needs to allow for expansion. • Susceptible to failure as per all disk drive based equipment. • Needs back up. 	Maybe, but needs a good backup solution. May be suitable for access copies as long as backed up (see notes below re Preservation and Backup).
LTO (Linear Tape Open)	<ul style="list-style-type: none"> • Magnetic tape in a cartridge read by a LTO reader. • Currently at LTO-6. Stores about 2.5 TB per tape. • Can expand to multiple drives; effectively a server using multiple tapes interfaced by the operating system. 	<ul style="list-style-type: none"> • Very stable, forwards and backwards compatible in versions. • Good archival life span. • Very robust. • In the digitisation workflow the digitised file(s) would be first stored on a local hard drive and then transferred to a LTO as soon as possible. • Needs backup. • Does not enable files to be watched while accessing. Full file needs to be “restored” before it can be watched. • Costs round \$3,000 for single writer/reader device and around \$60-\$80 per tape. 	Yes, but also needs backup and use is really only for preservation masters (see notes below re Preservation and Backup).



Two drive LTO enclosure

Storage			
Storage Option	Description	Comments	Recommended
RAID (Random Array Independent Disks)	<ul style="list-style-type: none"> • Magnetic disk drive storage, with multiple drives, • Data is distributed across the drives in one of several ways, referred to as RAID levels, depending on the specific level of redundancy and performance required. • The different schemes or architectures are named by the word RAID followed by a number (e.g. RAID 0, RAID 1, RAID 5). Each scheme provides a different balance between the key goals of reliability, availability, performance, and capacity. • The actual storage available on a RAID setup is not directly equivalent to adding up the storage capacity of each drive in the setup due to the duplication of data across the drives. For example in a RAID 1 configuration with 2 x 1TB drives only 1 TB storage is available. 	<ul style="list-style-type: none"> • Even though specific RAID levels provide for redundancy by replicating data across one or more drives, drives can fail. Failure of two drives within a short time of each other can mean that data can't be recovered. • Some RAID storage solutions are configured as "Network Attached Storage" (NAS) devices and can be used for accessing and storing data across a local area network through an IP address. 	Yes for storage of access copies, but needs regular weekly backup as a disaster response in the case of multiple RAID drive failures.

Storage			
Storage Option	Description	Comments	Recommended
 <p>5 Drive RAID Storage</p>			
Cloud	<ul style="list-style-type: none"> Storage provided by a company/Internet service provider accessed through the Internet. Can be free (for example Dropbox) or commercial through data storage companies. 	<ul style="list-style-type: none"> Access speed for uploading and downloading media is dependent on the available Internet. Some cloud services targeting storage of archival objects have a significant delay time in being able to download a file, but have relatively cheap storage prices, See Amazon Glacier at http://aws.amazon.com/glacier/ 	<p>Yes as the third preservation master storage solution or as backup /redundancy for access copy RAID. BUT needs careful consideration of data security, trustworthiness regarding management of cultural content, longevity of company.</p>

Preservation and Backup - Storage

Three copies of a preservation master are highly recommended. These copies should not be considered as backup. The copies should be created at the same time, with an individual master stored on each of the three selected storage solutions. Each storage solution is ideally placed in different locations.

Storage solutions need to be maintained regularly with media files migrated to new generations as needed. For example migrating LTO-6 to LTO-8.

An off-site backup strategy for access copies storage could be a tape based solution or a hard drive solution depending on the size of the media files collection. The frequency of backup is according to organisational needs but should be at least weekly.

Estimating the storage needed

Refer to the storage calculator provided through IRCA for estimating the total storage needed for your collection size.

Recommendation: choose a storage solution that is scalable rather than buying all the storage at one time. Storage drops in price over time.

Data integrity

Prior to storage, files should be run through checksum software. In addition wrapping of preservation masters in mxf or axf is recommended. The mxf wrapper is available through Apple Compressor.