

## Storing Your Memorabilia © Colin Pask 2006 - 2013

On December 25, 1994, near the village of Vallon-Pont-d'Arc, in the Ardche gorges in southern France, explorers Jean-Marie Chauvet, Eliette Brunel-Deschamps and Christian Hillaire discovered an exceptionally important gallery of Paleolithic rock art. Grotto Chauvet had been hidden and perfectly preserved due to a prehistoric landslide covering the entrance hundreds of centuries ago.

Initially the explorers noticed a draft of air in the minor cave they were surveying. After clearing a narrow passageway they made their way down a shaft and then into a vast network of galleries and rooms, several hundred meters in length. The explorers found numerous wall paintings and remains of cave bears. Some of the cave bear skulls had been moved to a special position by humans. Since that first amazing discovery more than 300 paintings and engravings have been documented. Carbon dating has been used to find that these works of art were made around 32,000 years ago.....the oldest known cave with wall paintings in the world, and perhaps the first attempt at family memory making. They have survived because of the constant temperature and humidity of the cave.<sup>1</sup>

Another remarkable piece of history is the Gospel of Judas of which only one copy is known to have survived. Hidden over eons in the Egyptian desert, it was finally uncovered late in the 20<sup>th</sup> century. Then it vanished into the netherworld of antiquities traders, one of whom abandoned it for 16 years in a bank vault in Hicksville New York. By the time it reached conservators in 2001, the papyrus on which it was written – a form of paper made of dried water plants – was decaying into fragments, its message on the verge of being lost to the world forever. Fortunately the text has been able to be recovered.<sup>2</sup>

About four months ago, I printed a digital family photo on my trusty ink jet printer, onto cheap photographic paper after which I placed the printed photo on the door of the family refrigerator. Although the photo does not get any direct sunlight, it has already faded so greatly that it is about to be filed in the waste paper basket.

I write the above examples to demonstrate the difficulty faced in storing memories for future generations. We don't all have a secret cave in which to record our memories. And anyway, we have a lot more memories to leave our ancestors than a few drawings. In this paper we will explore the various medium for storing your memories in words, pictures, sound and data, so hopefully, when your ancestors find your memoirs they will be able to view and hear all that you have left for them.

### Types of media

Firstly, let us look at the various formats for recording memories and the alternatives for storing these memories. The following table is not definitive, but hopefully it will stretch your mind as to the various alternatives available.

Format	Recording Medium	Storage Medium #
Text	Handwritten Typewriter Computer ( word processor)	Paper / Ink Electronic / Digital Storage
Photographs	Camera - film Camera ( instant – eg Polaroid) Camera - Digital Camera - Computer Scanner - Computer	Negatives Slides Printed photographs Electronic / Digital Storage

<b>Picture &amp; Sound</b>	Movie Camera Video Recorder CamCorder Computer - Video Camera and Mic. Digital Camera	Movie Film (eg Super 8) Cassette Tape Electronic / Digital Storage
<b>Sound</b>	Tape Recorder Cassette Tape recorder Computer – microphone Digital Voice Recorder	Reel-to-reel Tape Cassette Tape Electronic / Digital Storage

Note# The Storage Medium applies to all or most of the Recording Medium items in that Format group.

## Technology

You will notice that in the table above, a lot of the recording and storage medium have only been around for a relatively short time. They are a result of the technological age in which we live, a time of great excitement and amazement at the extraordinary changes in technology continually facing us. Unfortunately, whilst the media for storage is vast and effective for the short term, the long term storage (ie storage for more than a couple of decades) is another matter.

In the mid 1980s, I managed a team of sales people who sold a combined computer and telephone – it was called a ComputerPhone. The ComputerPhone had a basic word processor and the storage medium was a very small tape cartridge. If I had stored my memories in text on such a cartridge, I doubt if anyone today would be able to read or retrieve the material from the cartridge. Or if I had used 5 ¼ inch floppy disks in the 1990's to store my memories, how long will it be before these diskettes are unable to be read by anyone other than perhaps a specialist shop? Worse still, in years to come, no-one may be able to retrieve the data at all.

And what about CDs and DVDs? Will they be able to be read in another 20 years or 50 or 100 years? If you think CDs will be around in 50 years, think again. At the rate technology is changing, CDs will go the same way as the wax cylinders used by the Edison Recorder for speech and music, and the same way as reel-to-reel tape recorders have gone.

Technology is a fantastic help to us all in our daily lives, but as sure as night turns into day, it will keep on changing and you need to very carefully consider the technology you use to record your family memories.

## Storage Media

Each of the media identified in the table above, are discussed in this chapter. The star ratings shown are my subjective ratings and are an estimate only. They need to be viewed in conjunction with the associated text and information from other sources.

Value for Money

The more stars, the better value for money.

Life Expectancy of data

The more stars the greater the life expectancy of the data using this media.

Current Technology	The more stars, the more current the technology.
Affected by Technology	The more stars, the less the media is affected by changes in technology.
Overall suitability for the storage of memories	The more stars the better this media is overall for the storage of data.

## Photographic Prints

Value for Money	★ ★ ★ ★
Life Expectancy	★ ★ ★ ★ - less for ink-jet printed photos
Current Technology	★ ★ ★ ★ ★
Affected by Technology	★ ★ ★ ★ ★
Overall suitability for the storage of memories	★ ★ ★ ★ - Provided it is properly printed and stored

The printing of digital or negative images in photo-labs both use the same process whereby the digital or negative image is exposed onto photosensitive paper and then developed as prints. The longevity of these photos depends upon the quality of the photographic paper and this varies between paper manufacturers. Each manufacturer will produce different qualities of photographic paper, so it is essential to check with the processing lab before you have your cherished photos printed.

Then we have photos produced on inkjet printers attached to computers. There are two types of ink used in these printers – pigment ink which lasts considerably longer and dye ink which some people feel provide brighter colours. Dye ink cartridges are also cheaper to replace. It is not possible to change between pigment and dye ink in the one printer, so if you want to keep your prints, select a printer which uses pigment ink.

Whilst technologies of inkjet printers and their inks are continually changing, it is believed that good pigment based ink on good photographic paper will last over 100 years before noticeable fading occurs, whilst prints using dye based ink will start to deteriorate after 10 to 20 years.

The storage of prints is critical to their longevity. Prints exposed to ultraviolet light will deteriorate more rapidly than those kept in darkness. Even framed prints will fare better than unframed prints as the glass will reduce the ultraviolet light striking the print.

Prints for keeping, should be stored in a special album using acid free papers, and the album should be stored in a cool dark place. This will significantly extend the life of the prints.

Prints, if printed correctly on good quality paper and stored appropriately, are a very good way of preserving your memories for future generations.

For an excellent website for technical information on the specific longevity of individual photo printing systems, visit the Wilhelm Imaging Research, Inc <http://www.wilhelm-research.com>.

## Paper and Ink Storage (Text only)

Value for Money	★ ★ ★ ★ ★	
Life Expectancy	★ ★ ★ ★	
Current Technology	★ ★ ★ ★ ★	
Affected by Technology	★ ★ ★ ★ ★	
Overall suitability for the storage of memories	★ ★ ★ ★	- Provided it is properly printed and stored

Text on appropriate paper using appropriate ink has proved to be a reliable medium for the storage of memories....provided it is stored appropriately.

Handwritten – Use good quality paper with ball point pen or ink.

Computer Generated - paper selected should be of good quality and be acid free. Ink used should be pigment ink rather than dye ink as dye ink will fade over time. Paper and Ink from the same manufacturer is recommended as they are designed to go together for the maximum life expectancy.

It is preferable that storage is in an airtight container away from light, heat and moisture.

Also see the section above on photographic prints for more information.

## Photographic Albums

Value for Money	★ ★ ★ ★	
Life Expectancy	★ ★ ★ ★	
Current Technology	★ ★ ★ ★ ★	
Affected by Technology	★ ★ ★ ★	
Overall suitability for the storage of memories	★ ★ ★ ★ ★	- Provided it is properly stored

Since initially writing this paper, a new medium has emerged, for which I am a big fan. That is the ability to send photos and printed material to be printed into 'photographic albums'.

Books printed over 100 years ago are still with us today. So it seems likely that photo albums, professionally printed and stored appropriately, will still be around in 100+ years.

To date, I have had a few albums printed by Apple <sup>™</sup> and I have been delighted with the overall result and quality. Provided these albums are stored appropriately, there is no reason why they will not be just as viewable in 100 years.

Avoid putting too many pictures on a page. Limit each page to no more than 4 photos, and preferably less.

Avoid cheap printers - usually it is the old adage ....'you get what you pay for!'

## Negatives, Slides, Movie Film

Value for Money	★ ★	
Life Expectancy	★ ★ ★	
Current Technology	★ ★	
Affected by Technology	★	
Overall suitability for the storage of memories	★ ★	- Provided it is properly stored

The development of photography and film has evolved over the past 180 years with many improvements as technology and chemicals have changed. In 1889, Eastman Kodak pioneered the first practical use of flexible, transparent film having a nitrate base. Other materials used for film and negatives include Nitrate and gelatin, cellulose acetate in 1923, cellulose diacetate in 1937, cellulose triacetate in 1947, polyester (polyethylene terephthalate) base in 1955,

Research has shown that nitrate, diacetate, and triacetate materials will deteriorate in much the same way and at essentially the same rate (Reilly, 1993). This research also indicates that the rate of deterioration is highly temperature and humidity dependant. Therefore, the age and type of film base of a particular negative has little bearing on its condition or future potential for deterioration.<sup>3</sup>

I have some slides taken in Cradle Mountain Tasmania around 1966 (40 years ago) which show little deterioration whilst some colour negative film taken around 25 years ago has definitely deteriorated to the stage where recent prints from the negative do not contain the same in-depth colour.

My father was a keen photographer and I had around 200 negatives taken in Launceston Tasmania around the early 1930's. I stored the negatives in a cupboard in my garage thinking they would be safe. Unfortunately water leaked into the cupboard and all the negatives stuck together – I still lament the lost of this piece of Australian history. So where you store your memories, and how you store them, is critical.

So how do you archive film and negatives for future generations? The short answer is that you can't as the image is not likely to still be there in 100 years. You may be lucky to successfully store film for 50 years but only under the right conditions.

Film-based negatives are more stable if kept at or below the freezing point of water. In fact, cold storage is predicted to extend the life of diacetate and triacetate negatives in good condition by a factors of ten or more.<sup>3</sup> If cold storage is not viable, then store them in the coolest possible place – not in the attic – for maximum life

Negatives should be stored in water-proof/air-tight/insect proof boxes made from acid free material. Also, material used to separate the negatives must be acid free. Rolls of negative film should be cut into strips and stored appropriately.

And finally, think about printing your photos and storing them as detailed under 'Photographic Prints', and as well as printing, consider digitising your slides/negatives (by scanning into a computer) and storing them on a suitable electronic medium.

## Electronic/Digital Storage

Electronic/Digital Storage is a blanket term for the following storage media

- Tape
- Hard Disk Drive
- Floppy Disc / Diskette
- CDs / DVDs
- Solid State Storage ( Memory Sticks, SD Cards, Flash storage etc.)

### Tape

Value for Money	★ ★ ★
Life Expectancy	★ ★
Current Technology	★ ★
Affected by Technology	★
Overall suitability for the storage of memories	★

The first patent for the magnetic tape to be used for recording purposes, was granted to Fritz Pfleumer, a German, in 1928. His tape was made from paper with a coating of pulverised iron particles which could be 'permanently' magnetised.

Magnetic tape has come a long way over the years and various materials have been used, rather than paper, as the base material for the now ferrous oxide coating which is used. Irrespective, the principle is that sound/video/data is stored on the tape by permanently magnetising the particles on the tape.

Once you understand the way magnetic tape stores data, it is obvious that it can be affected by magnetic fields which can destroy part or all of the data. Also the word 'permanently' used above, is for a number of years, but not indefinitely. General thinking is that the magnetic field does deteriorate over time and tapes can only be expected to last a maximum of about 40 years and then only if stored properly. I have some reel-to-reel voice and music tapes and they are still OK after 40 years – but for how much longer I am not sure. Better quality tapes cost more and usually last longer than cheaper tapes.

Magnetic Tape has been/is used for the following

Tape recorders (sound)	Reel-to-Reel Tapes Cassette Tapes Cartridge Tapes
Video recorders	Video Cassette Tapes
Camcorders	Video Mini Cassette
Computers	Reel-to-Reel Tapes (early computer storage) Mini cassette tapes

Magnetic Tape is also subjected to technical obsolescence. It is unlikely that the equipment to replay it will be around in 100 years – even if the data on the tape lasts that long.

Magnetic Tape devices are therefore not recommended for long term archival storage

## Hard Disk Drive (HDD)

Value for Money	★ ★
Life Expectancy	★ ★ ★
Current Technology	★ ★ ★ ★
Affected by Technology	★
Overall suitability for the storage of memories	★

A hard disk drive (HDD) also called a "disk drive," or "hard drive," stores and provides relatively quick access to large amounts of data on an electromagnetically charged surface or set of surfaces. Today's computers typically come with a hard disk that contains several billion bytes (gigabytes) of storage.<sup>3</sup>

An HDD should be looked at as temporary storage only. Someone once said to me that "it is not a case of whether or not a hard drive will fail, it is a case of when will it fail". Well although I am still waiting for my first hard disk drive to fail, I have had some scares with virus making my HDD temporarily unreadable. If I do ever lose the data on my HDD I have it all backed up on DVD, so hopefully I will be able to get all my data back.

However, storage of memories on a hard disk drive is courting danger. Even if the HDD survives the rigors of time, will anyone else know where your memories are on the HDD? And if you remove the HDD from the computer and store it in a safe place, will anyone be able to connect it to a computer and read it in 50 or 100 years? I would not like to take that risk and I strongly suggest that you don't take that risk either.

Hard Disks are therefore not recommended for long term archival storage

## Floppy Discs / Diskettes

Value for Money	★ ★ ★
Life Expectancy	★
Current Technology	★
Affected by Technology	★
Overall suitability for the storage of memories	Not Recommended

A Floppy Disk is composed of a thin flexible disk which has a magnetic material on it. The two most common sizes are 5 ¼ inch disks and 3 ½ inch disks which are also referred to as 'diskettes'. The flexible disk is housed in a stiff paper case for old 5 ¼ inch disks and a plastic case for 3 ½ inch disks. The disk is read and written on by a special drive called a Floppy Disk Drive in a computer.

The concept for storing data on Floppy Discs / Diskettes is similar to Magnetic Tape and hence they are also affected by stray magnetic fields and they lose their magnetism (and therefore data) after a period of time. Floppy Discs/Diskettes are also subject to being affected by dust and dirt. Better quality Floppy Discs/Diskettes will last longer but they should only be used for short term storage – certainly do not expect your data to still be there in a couple of years.

Floppy Disc / Diskette Drives are at the end of their product life cycle. I can no longer read the old 5 ¼ inch Floppy disks I have on my study shelf as I no longer have a 5 ¼ inch floppy Disk drive. As I write this, many new computers are not being supplied with any Floppy Disc Drives. Consequently, I would think that within 10 years most people will not have the equipment to be able to physically read a Floppy Disc / Diskette – even if the data on the disk has survived.

Floppy Disks / Diskettes are certainly not recommended for long term archival storage

## CDs / DVDs

Value for Money	★ ★ ★ ★
Life Expectancy	★ ★
Current Technology	★ ★ ★ ★
Affected by Technology	★
Overall suitability for the storage of memories	★ ★ ★ - Gold CDs/DVDs only

In the early 1990's, a CD-recordable disk was developed having a sensitive layer that could be 'burned' by a laser to create 'pits' which are similar to a conventional CD and hence could be read by CD Drives. DVDs are the same size as CDs but can store over 6 times the amount of data that CDs can store. CD-RW - Rewritable disks are now available but are not as reliable as CD-Rs and DVD-Rs and hence CD-RWs are not recommended for archival storage.

When CDs and DVDs first came along they were hailed as being the media for long term storage of data. They appeared to be the perfect answer for those who wanted to keep data for more than a lifetime.

Recently, Kurt Gerecke, and IBM expert on data storage told *PC World* that two years is about the average life expectancy of a burned disc, perhaps five if you store it in a cool dark place. Apparently burned discs have a short lifespan compared with commercially pressed discs.

With CD/DVDs, it appears that you get what you pay for. Cheap discs look attractive but won't last. The more expensive brand named discs are better but only by about five years.

However, all is not lost. There are some discs on the market which use gold in their reflective layer which it is claimed make them impervious to temperature and humidity and therefore resistant to oxidation. The distributors promise a life of 100 years for CDs and 300 years for DVDs. These discs are about 4 times the price of normal CDs or DVDs but represent excellent value for the long term storage of data. Such discs are sold under the name **Delkin eFilm Gold** CD and DVD blanks

Overall – Only *eFilm Gold* or equivalent CDs and DVDs are recommended for storage of memories, but be aware that changes in technology might make these redundant within a decade or so and hence it may be difficult to retrieve the data from them.<sup>4</sup>



## **Solid State Storage : ( Universal Serial Bus (USB) devices such as Memory Sticks, SD Cards, Flash Storage, etc.)**

Value for Money	★ ★
Life Expectancy	★ ★ ★
Current Technology	★ ★ ★ ★ ★
Affected by Technology	★
Overall suitability for the storage of memories	★ ★ ★

Solid-state storage is a non-volatile, removable storage medium that employs integrated circuits (ICs) rather than magnetic or optical media. It is the equivalent of large-capacity, non-volatile memory. Examples include flash memory (as used in Digital Cameras) Universal Serial Bus (USB) devices and various proprietary removable packages intended to replace external hard drives.

The main advantage of Solid State Storage is that everything is electronic, and they don't contain any mechanical parts. As such, the transfer of data is much quicker than devices such as electromechanical disk drives, although currently they do not have the storage capacity of disk drives. Also, the cost per megabyte of solid state storage devices is much greater than for hard disk drives.<sup>5</sup>

The main drawback of Solid-state storage is that it is relatively expensive (although coming down rapidly) and the long term storage of material on such media is unknown at this stage.

Currently not highly recommended for storage of memories, however this could change as technology improves.

## **Conclusion**

Format and equipment obsolescence are far more likely to make stored data unreadable than physical degradation. Today's technological age and specifically the digital age are driven by vendor/marketing systems which rapidly become obsolete. Little if any thought has been given to the long term preservation of historical data. This makes the long term saving of memories such as picture / sound / video / electronic print, extremely difficult. We can almost guarantee that the systems in use in 100 years will not be able to retrieve data stored in the formats used today.

So what should you do?

- You should get a reputable photo print company to print your memorabilia photos onto good quality acid free photographic paper. You should then store these photos in an acid free album.
- Alternatively, send your digital photos (scan any printed photos you want) to be printed into an album, then store that album away from heat and sunlight - preferably in an airtight/watertight container
- You should print any information you want to pass to future generations onto acid free paper using pigment ink or handwritten with suitable pen.

- You should save Images / Video / Data you want to keep onto CD/DVDs which have gold in their reflective layers. You should review these CD/DVDs every 5 years to determine if any better medium is available for the long term storage of this digital data.
- If you have the ability to store images and written information on microfilm, then do that as microfilm is purported to have a life of 500 years if properly cared for.
- You should store all the above in a fire-proof safe in a cool location.

Then hopefully in 150 years when your ancestors finally work out how to open the safe, they will discover a wealth of well preserved information from an amazing age, long past.

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<sup>1</sup> The Dawn of Prehistoric Rock Art ©1998 by James Q. Jacobs [www.jqjacobs.net/rock\\_art/dawn.html](http://www.jqjacobs.net/rock_art/dawn.html)

<sup>2</sup> Excerpts from an article titled 'The Judas Gospel' National Geographic May 2006 Pages 78-95

<sup>3</sup> Definition from On The Go PC at [www.onthegopc.com/index.asp?PageAction=Custom&ID=5](http://www.onthegopc.com/index.asp?PageAction=Custom&ID=5)

<sup>4</sup> Excerpts from an article titled 'Burning for the long haul' by Terry Lane. - The Age Greenguide, Thursday June 15<sup>th</sup> 2006,

<sup>5</sup> Definition from SerachStorage.com at

[http://searchstorage.techtarget.com/loginMembersOnly/1,289498,sid5\\_gci1008096,00.html](http://searchstorage.techtarget.com/loginMembersOnly/1,289498,sid5_gci1008096,00.html)