Conservation of National Defence Digital Images

The Working Digital Collection: Preserving for the Future

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Abstract

The National Defence Imagery Library (NDIL) has a collection of over one million images dating from WWI to the present. The role of NDIL is to safe keep and provides images in an operational role for the Canadian Military and Government. Our library handles motion pictures on film and video (conventional and digital) as well as still images (acetate based negatives and positives, digital). For the purpose of this paper we will be mostly talking about still images. The most common format of our collection is 4X5 inches Black and White negatives but we also have glass plates, 8X10inches, 120mm and 35mm acetate negatives and positives. In 1997 we started to digitize the most popular images of our collection and we have, at the moment, 120,000 images digitized. We are conserving also over 1000 original drawings of Canadian Forces Heraldic Badges signed by King George, Queen Elizabeth 2 and other dignitaries.

Metadata

The IPTC (International Press Telecommunications Council) fields of the digital images are used to enter the necessary Metadata. This standard includes entries for captions, keywords, categories, credits, and origins. Some third-party image browsers can also search the captions and keyword entries. That information is entered using Adobe PhotoShop file info feature or other similar software such as Nikon View or Kodak PhotoDesk. We have standardized our procedures by assigning specific fields for our departmental requirements. All Canadian Forces Imaging Sections along with a very specific image numbering standard use that procedure.

Then our images are imported in our Image Asset Management software Extensis Portfolio 6. The Portfolio fields have been customized and mapped to transfer that IPTC info in the proper fields. That allows us to produce a catalogue of our digital collection complete with thumbnails, image descriptions and a powerful search engine. From that catalogue our customers can search our images collection, see an enlarged view of the image and select necessary images for the different requisitions. Historians, producers, authors and other professionals visit us frequently to gather images for their projects. Most recently, the Juneau Beach Museum in France used our catalogue to select many WW II Canadian Military images.

The database used for the Audio Visual Library (film/video) is called Cyclop and contains film titles, footage and descriptions of this collection. The Meatadata is searchable but contains only text, not images.

Temperature and Humidity

We are located in an older building at the Canadian National Research Council campus in Ottawa. We are monitoring our vaults to maintain acceptable temperature/humidity ranges. Limits are:

Temperature:	10C to 23C
Humidity:	10% to 50%

The acquisition of a Scientific Thermo/Hygrometer and ten Digital Thermo/Hygrometers allows us to monitor the building's environmental conditions. Presently we have an average of 35% humidity and 20C temperature in our storage vaults, which are within the parameters. When the humidity level increases, such as during the summer, dehumidifiers are used to maintain an acceptable humidity level.

Standards

We have recently written archiving procedures for digital images records. That document was distributed to our 46 Canadian Forces Imagery Sections. The Mitsui Gold CD has a life expectancy of 300 years and is the required CD to preserve digital images. The following are the standards established.

General

1. CDs are one of the modern storage media used to record and archive digital images. To ensure the optimum image recording quality and data storage longevity, the highest quality CD must be used.

Recordable Media

2. For archiving purposes, electronic images are recorded on a medium that exhibits the longest possible data retention period. According to archivists in North America and Europe, the Mitsui **GOLD** CD-R is the best medium on the market, and therefore is the only acceptable archiving storage medium. The Mitsui gold CDs will not oxidize and their life expectancy is 300 years. On the other hand, silver and other CDs should not be used as life expectancy is only 5 to 80 years and will oxidize eventually.
3. Since Kodak stopped manufacturing Gold CDs, the only source that we know of is Mitsui.
4. The attached Web Link provides more information on Mitsui Gold CDs.

http://www.cddimensions.com/cd-r_media/mam-r74gpg-cb.asp

Note: For those interested in Gold DVDs, Mitsui stopped making Gold DVD+Rs just a short time ago, but will probably produce them again when the DVD industry will have their problems solved.

Media Labeling

5. **Do not use CD Labels ever.** All CD labels contain adhesives that are acidic and will eventually destroy the digital information. Additionally, ink jet printer inks used for printing "CD Labels" on white surfaced CDs, as well as regular markers are acidic and should not be used.
6. However, all CDs must be identified, but only by hand written information by using an **acid free** CD marker made for that purpose and only on the hub of the CD (clear center portion).

Media Storage

7. Only thick jewel cases are used. The slim jewel cases or the CD paper envelopes rub against the CD surface and will destroy the data eventually.
8. As the CD content and image information is available and searchable using the image assets management database (Portfolio Metadata), there is no need for a jewel case label insert.
9. It is understood that archival CDs are to be stored in a suitable environment.

CDs for Non-archival Purposes

10. It is acceptable to use silver CDs with normal printed labels for non-archival purposes, such as providing imaging products to customers.

These standards should ensure the best longevity of our Digital Images. We archive all pictures received from all Operations, i.e. Afghanistan, Bosnia, East Timor, etc. and it is imperative to preserve these historical digital images for future generations.

Manageability

Our collection is quite large and we still have over 900,000 negatives/positives to scan. Before proceeding with that task it was imperative to set adequate standards. We had to determine the resolution, file format and size that we would need in order to preserve the highest quality from the original. Before doing so I attended a one-day in-house course on proper scanning techniques.

This in-House Scanning Course provided by Eliquo Training and Consulting. (See Annex A for course content)

Scanning Techniques

Scanning shall be at 100% film frame size, meaning if a negative is 6cmX6cm the scan should have a 6cmX6cm size. Always use the scanner's maximum Dot Per Inch (DPI) or divide maximum DPI by even numbers: i.e.: if scanner maximum resolution is 3200 DPI scan at: 3200, 1600, 800 or 400 DPI; if your scanner as a maximum resolution of 4000 DPI scan at 4000, 2000, 1000 or 500 DPI. Usually a 2000 DPI scan will produce high quality manageable files for 35mm, 21/4inches and 4X5inches negatives.

TIFF file size at 2000 DPI

35mm	35 Megs CMYK
21/4inches	60 Megs CMYK
4X5inches	80 Megs Gray scale

Conclusion

The course provided solutions to scanning problems. The information given is precious and Scanning Standard Operation Procedures (SSOP) was written to preserve and use the lessons learned.

Scanning Standards

1. All negatives shall be scanned at 2000 DPI approximately (Depending of the scanner used).
2. Scans shall be same size (100%) as the original.
3. Scan shall be at 14 or 16 Bit (Nikon scanners are 14 Bits, all others 16 Bits but are 14 Bits really).
4. File should be saved as Tiff uncompressed.

Note: The DPI settings were chosen to obtain manageable Tiff files.

Implementation Approach

If we were scanning all of our negatives at maximum DPI it would slow down production drastically and our turn-around time would be unacceptable for our customers. A 1.5 Meg Jpeg allows us to enlarge to 16 by 20 with acceptable results.

Having conservation in mind, we are scanning at higher resolution and we eliminated JPEGs.

To compete with film is almost impossible for the moment if we need quick access to our digital images. The recommended method to scan negatives is to use a good drum scanner and scan at maximum resolution at 100% negative size, but we had to change the maximum resolution to approximately 2000 DPI. The Imacon drum scanner has a maximum resolution of 3200 DPI and produces excellent results at 1600 DPI.

Strengthening Our Commitment

The manageability of our digital collection is of prime importance and for that reason we cannot afford to scan a color 4X5 inches negative to its full resolution of 3200 DPI. By doing so we would obtain a 614 Megs Tiff file.

We have an historic treasure in our libraries and we want to make it available to the public also. We take pride in our collections' conservation and we have the deep desire to preserve it for future generations.

Obsolescence

We are aware of the future obsolescence of our hardware and we are preparing for the worst. Preservation of obsolete hardware is our plan of attack. We would keep three of the same obsolete hardware or even more if this can allow access to our digital files

"We must learn to manage and migrate collections regularly, and live with impermanence"

Migration is the process of re-arranging the original sequence of structural and data elements to a new configuration or later generation of the same format, and is one of the major strategies use to address obsolescence.

In 1879 Thomas Edison invented the first commercially practical incandescent electric lamp. I am certain that then, people were waiting for a drastic improvement on this invention but this Thomas Edison idea is still in use today on a very large scale. We are hoping that the CD format will survive for at least 100 years.

Images of the Future

By 2005, all Canadian Forces Imagery Technicians will stop using film and will only use digital cameras. Presently, more than half of our technicians are working in digital only; for these reasons solid digital images conservation procedures are essential. Digital imagery provides efficiency, image publication rapidity and ease of database search through Metadata.

The Nikon D1X is our workhorse camera. This camera takes RAW files (NEF file extension) that provide almost as much image information as a negative. With digital image files the worry of dust, scratches and processing problems are absent. The digital image concept will render film almost obsolete, and this science is still in its infancy. The Nikon D1X camera's 7 Megs NEF files do not create a manageability problem. We can write 100 of these images on one Gold CDR.

Princeton University of New Jersey researcher created a new way to store data on a card about the size of a matchbox. The single-use card of polymer and thin silicon-based electronics, can store more than one gigabyte of information. This technology based on a plastic polymer called PEDOT (polyethylenedioxythiophene), could be available within 5 years and it could be a viable alternative to CDR storage. PEDOT polymers have been used for years as an anti-static coating on photographic film.

The Audio Visual Research Library (AVRL)

The AVRL holds a collection of almost 30,000 (29, 983 actually) productions masters and stock footage camera originals either on film or in various tape formats from the early 50's until now. This number includes some WWII tapes from various sources (not all Canadian) as well as 106 weeks of WWII newsreels.

The Metadata holds all information on these 7127 productions and 21,856 tapes of stock footage. It is updated regularly with new productions as well as new footage provided by Combat Camera and deployed Canadian Forces photographers.

AVRL Personnel Perform the Following:

They review all the videos received at the library, shot list them if required and then created a BEST-OF or compilation tape.

They then number and catalogue the tapes by category of Air, Land or Sea and then subdivide them under one of 123 subject headings.

Then data (THE SHOT LIST) is entered into CYCLOP our Database. In addition to these tasks, Libray personnel also research video footage (a production clip), which can take anywhere from a few minutes to a few hours depending on how much information is provided by the customer.

We provide footage to Public Affairs Creative Communications Services for Canadian Forces training productions and CF public awareness videos, AVRL provide clips to Major News media such as the Canadian Broadcasting Corporation and Discovery Channel to name a few. We also dub video and audiotapes for the NIS (National Investigation Services)

In 2000, Public Affairs undertook to digitize 3900 film originals (Grey cans consisting of DIS/public affairs stock footage and Red cans consisting of stock footage taken between the 50's and 80's), which had not been entered into the Metadata.

Over half of these have been done and Public Affairs are awaiting more funds to transfer the remainder.

Since new material keeps coming in and many older productions have yet to be entered, PERSONNEL resource is always a problem. Currently two contractors provided and paid for by Public Affairs are working full time on entering

archival footage plus RED AND GREY CANS into the Metadata.

The conservation aspect of this Audio Visual Library is under way. Modern shelving systems were installed and the monitoring of temperature and humidity of the AVRL vault is performed daily. Many old films are transferred on Betacam SP tapes until a new method of conservation is approved. DVDs would not be acceptable because of the compression process used. Engineers are indicating that hard drives are the best digital method for film or video preservation. We might have to take this avenue someday.

Planning

There is discussions regarding the feasibility of joining the "Images Canada" project. Images Canada provides a central search access to the thousands of images held on the websites of participating Canadian cultural institutions. Through Images Canada, people can find images of the Canadian events, people, places and things that make up our collective Canadian heritage. This organization is formed by a group of partners such as the National Aviation Museum, the Canada Science and Technology Museum, the National Library of Canada and others.

Also the National Defense Imagery Library will display its collection on the "www.Forces.gc.ca" web site. This site is administered and owned by the Canadian Forces and provides information of all military activities and bases.

Conclusion

We, at the National Defense Imagery Libraries, are very proud of our collections and we are taking all means to conserve it. With the help of our superiors, we will be able to fund and achieve this important task. We are gladly making available our collection to the international public. You are more than welcome to contact or visit us if you need our services.

References

1. The Ottawa Citizen 15 November 2003 article titled: Princeton researcher creates massive memory on tiny card.
2. The Mitsui Gild CD-R, the Gold Archive Standard. PDF File /http://www.cddimensions.com/pdf/MAM-GOLD.pdf
3. Eliquo Training and Consulting: Scanning Techniques with Adobe Photoshop 7.0.
4. Canadian Forces Imaging Services/ Mr. Michel Roy:IPTC (International Press Telecommunications Council) insert and revision.
5. Canadian Forces Joint Imagery Centre. Imagery Libraries Warrant Officer WO Serge Peters: Audio Visual Research Library.
6. Preserving Audio-Visual Records of the University of Manitoba Archives & Special Collections-A Case Study; Paper by Jane Dalley September 2003.
7. Council on library and information resources risks assessment study, 1999.
8. Images Canada Web Site Ms Brenda Campbell: *www.imagescanada.ca*

Annex A

Course Content

1. Scanning techniques and theory information.
2. Photoshop instruction to perform better scans.
3. The booklet created for this course covered the following subjects:
    a) Photoshop Scanning Settings
    b) Finding your scanner's sweet spot
    c) Do you Really Need all that Resolution?
    d) Bit Depth, Scan Mode and File Size
    e) Proper Set-up of a Scanner
    f) Scanning Line Art
    g) Scanning CMYK
    h) Scanning Negatives
    i) Scanning Slides
    j) How to Scan a Book
    k) Scanning Tips: Scan Properly and Save Time
    l) Scanning for Output Methods
    m) Scanning Great Background effects
    n) Enhancing Scans using Photoshop
    o) Scanning FAQ