

**Balancing Traditional Photograph Preservation with Today's Digital Access:
An Educational Opportunity**

**Amigos Fellowship Final Report
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Submitted by

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MEMORANDUM

Date: 28 December 1997
To: Bonnie Juergens, Executive Director, AMIGOS Bibliographic Council, Inc.
From: Tim Blevins, 1996 AMIGOS Fellowship award recipient
Re: Final Report

Thank you for awarding me a 1996 AMIGOS Fellowship award to attend "Preserving Photographs in a Digital World," a workshop presented by the George Eastman House and the Image Permanence Institute in Rochester, NY, August 17-22, 1996. The workshop provided participants with current detailed information regarding the preservation of photographic images and electronic access. A faculty of 16 of the most respected scientists and practitioners of photograph preservation and digital imaging, along with fifty participants from the United States, Europe and South America, contributed their knowledge and experiences to complete a well organized and thoughtful educational experience.

The intensive workshop, held at the George Eastman House International Museum of Photography and Film (GEH), focused on the elements of photographic process identification, preservation planning, digital imaging, and environmental issues. Both lectures and practical laboratory exercises contributed to the experience.

Jim Reilly, Image Pennanence Institute (IPI), provided context to the workshop by lecturing on the technical history of photography and photographic processes. He discussed photographs as objects and emphasized the understanding of the material construction and its relationship to the causes of, and evidence of, deterioration.

Grant Romer, GEH, contributed his insight on the value of the photographic image and frequently elicited intellectual and emotional reaction with his witty delivery. His perspective addressed *why* it is important to preserve photographs. Grant visited RGHC three or so years ago to look at all of the tintype (ferrotype) photographs in our collections.

Debbie Hess Norris, University of Delaware, presented a lecture on preservation of photographs with an emphasis on preservation planning and disaster recovery. Additionally, she covered preservation priorities and needs assessment. She believes that the number one concern for photograph collections should be environmental assessment and control. No efforts to preserve any material is effective without a good storage environment.

Doug Nishimura, (IPI), lectured on the chemical properties of photographic materials and the effects of environmental conditions on these properties. Both temperature and relative humidity must be controlled to effectively limit deterioration of photographs. Doug presented the chemical activity occurring in the deterioration of different photographic materials. He also spoke about the most critical preservation problem facing almost all archives today: cellulose acetate base films. This type of film became popular in the 1930s and is still the most common film used today. It has an "inherent vice" which, over time, leads to self destruction. The only method of slowing this deterioration is by controlling the temperature and relative humidity in the storage environment. IPI provided workshop participants with a calculator which they developed to assist in determining the life expectancy of acetate film. Using this calculator today, 26 Sept.

1996, I find that what film we possess that has reached the early stages of “vinegar syndrome” will approach an “action required or lose it” stage in less than five years if our environment does not improve, or get worse. Some of the film we have has already reached the stage of “channeling” which makes the negative unusable.

Digital imaging basics were described by Jim Reilly and important elements of imaging, including quality control, preservation applications, and practical concerns were addressed by Carl Fleishhauer, Library of Congress; Franziska Frey, IPI; Anne Kenney, Cornell University Library; David Watson & David Wooters, Eastman Kodak Co.; and others. Concerns regarding objective methods for determining the quality of a digital image’s tone reproduction, color reproduction, noise and output modulation, have not been resolved to the complete satisfaction of anyone. Our approach-to-date on imaging the Library’s photograph collections is on target with what the Library of Congress and other leaders in photograph imaging are doing.

Franziska Frey, IPI, spoke about applications of digital imaging in preservation. She showed examples of her research on digital reconstruction of faded color images, simulated fading, and digital reconstruction of faded movie films. She also spoke about the use of, and access to photographs on the web. A somewhat heated discussion erupted during an evening roundtable discussion regarding Corbis (<http://www.corbis.com>) and its commercial efforts to provide access to unique archives and museum collections.

Information which specifically impacted my thinking on these subjects is evident in my notes (which I am willing to share with those interested). Changes have occurred in the latest research on cold storage of photographic materials and will impact our procedures and more cost-effectively utilize current resources.

After my conversations with many of the faculty of this workshop, I feel that the decisions that we have made regarding digital imaging of our photographs for access have been sound and are comparable to what others are doing. There is still a minority, to which I do not belong, that claims that digital imaging is a preservation activity. This, of course, depends on how one defines preservation. The general consensus at the workshop, however, is that imaging is a wonderful tool for access —nothing more than that at this time.

Why be Afraid? Digital Imaging Approached with FEAR

Many archives are facing pressures to digitize their photograph collections so that researchers can access unique materials without leaving home. The reality is that digitizing an archives' collections would be an expensive and complex activity requiring careful consideration of the issues of copyright, cost and demand. This is not to say that digital imaging does not have a place in providing access, and even contributing to a level of preservation. Digital imaging can also bring great benefits to an archives that can target the photograph collections that are frequently used, susceptible to deterioration, or have high intrinsic value.

Where does one start? Many archivists are not computer wizards. There is a great deal to learn about hardware and software and there is a vocabulary that, for some people, may as well be Greek. The mention of "digital imaging" causes some archivists' stomachs to tighten and a slight pinch of what usually triggers a killer headache. These anxieties, on top of the other demands of archivists' jobs, produce the most primal feeling of self preservation: FEAR!

Fear is good. Without it the human race would not exist. Fear keeps people rational. After analyzing the "Whys" and the "Whats" in the decision making process which resulted in the Rio Grande Historical Collections's Digital Reformatting Lab at New Mexico State University Library, it was discovered that in making decisions one can use FEAR to an advantage, specifically when contemplating digital imaging of photographs. How? Use the FEAR method for decision making.

The FEAR method is a silly acronym that helps to deal with a serious topic. It breaks down seemingly overwhelming problems into four distinct stages. The FEAR stages are: Funding, Equipment/Expertise, Approach and Rationale. The decision making process begins with the Rationale stage.

Rationale

The Rationale stage is where a lot of brainstorming occurs. There has to be a good reason to digitize an archives' photographs. An archivist might even discover that there are more reasons not to digitize. It is best to figure that out before money and effort are expended only to realize that technology is an albatross of problems in disguise. Since the rationale forms the basis for each of the three following stages of decisions, it is recommended to spend an adequate amount of time examining reasons to digitize or not to digitize.

Why not digitize? It is costly, the storage media are ephemeral, and the present-day equipment will certainly become obsolete in a few years. These concerns could lead anyone to abandon any hope of digitizing their photographs or to develop a "wait n see" approach.

"Wait in see" is a combination of fear and desire. One wants to do it, but by the time equipment becomes affordable there is new and better technology that is still unaffordable. This is true, and may always be true. If an archives buys equipment today, tomorrow that equipment will likely be offered on sale for a significantly lower price and something else twice as fast may be available the day after that. It is a losing proposition if this feeling is allowed to overcome all other factors. Though these are good reasons, the Rationale stage of the FEAR method must be completed before deciding whether or not to continue.

Digitizing photographs can increase access. Increased access will lead to increased use. This may be a reason to digitize or, a reason not to digitize if increasing use is not one of the archive's objectives. Why digitize? If well thought out, digitizing the photograph collections can increase researcher satisfaction and actually improve some aspects of productivity. Accessibility to visual resources can be efficiently handled using a computer as the delivery tool.

Although reformatting photographs into digital files cannot be considered preservation per se, there is a preservation benefit to digitizing that might be called “passive preservation.” Eliminating or reducing the physical handling of the photographs helps to preserve them. In the case of the RGHC project, cellulose nitrate base negatives have been targeted for digitizing so that these negatives can be stored in freezers. Nitrate base materials became a priority for digitizing.

If, after completing the Rationale stage, the decision is made to look further at digitizing photographs then the objectives and criteria for selecting the images to scan can be defined. This is further detailed in the Approach stage and can form the basis of a policy which can help keep the process on track.

Approach

The Approach stage is the next course of decisions to be made if a rationale for proceeding with the digital imaging has been determined. This is the point where objectives are honed into a plan. Research is necessary to discover options, alternatives and obstacles. It is sometimes helpful to do a little dreaming and describe possible needs as if this were a “perfect world.” This permits a broader view allowing never-before-imagined possibilities to surface. Talking to others who have digitized photographs may provide insight on how they have dealt with the scale of their projects, access points, and product output.

The scale of digitizing can range from just a few pictures to everything. This will be a refinement of the objectives formed in the Rationale stage. RGHC targeted three areas in its collection of 500,000 photographs: cellulose nitrate and cellulose acetate base negatives, frequently requested images, and collections which reflect the archive’s strengths in mining and water resources.

In the Approach stage it is important to determine what the possibilities are and how they support the rationale for digitizing. For example, it is important to consider access at the very beginning of planning. Who will get to see what and how? Is the objective to provide researchers in the search room with digital images or are there photographs in the collections that would be in demand on the Web? In the case of RGHC’s digital imaging, the search room will be the first location to access images; and, for control purposes, the only location where high-quality full-screen images can be browsed. Later, as more images are available in digital format, thumbnail-size images will be provided to researchers located on the campus network. The potential for unrestricted access is available, but it is not one of RGHC’s initial objectives.

It was apparent after doing research in the Approach stage that making more photographs available for research would almost certainly lead to increased requests for research and publication prints. This prospect was frightening considering that the current volume of print orders is already difficult to handle. Initially, it was not planned to make high-quality digital prints available, but it was realized that making images more accessible would lead to more darkroom work. A long-time desire to shift the focus of the RGHC darkroom to more acquisition copying and preservation duplication efforts, and less research and publication print production, could be obstructed with increased demand for such prints. It became obvious that the ability to provide photographic-quality 8"x 10" prints suitable for publication would be necessary. Image files which can provide publication quality prints are very large, averaging 6MB per image. Files of this size consume storage quickly.

Storage media is a popular point of argument when discussing permanence and life expectancy. Since digital imaging is not a preservation activity, one can consider all of the alternatives to have a more-or-less short life expectancy. Any storage medium requires proper storage conditions and a “refreshing” plan. Refreshing should be scheduled based on the latest information on the life expectancy of the medium and the viability of the media technology. It is important to keep pace with consumer-targeted secondary storage technology

because this is the media which will be supported for the longest period of time because of the market demand.

File formats and compression are other areas which can be considered in the Approach stage. There is no ISO agreed-upon file format for images. There are many internationally recognized formats that have become standard by industry agreement, but that is not to say that some software developers don't take some liberties. For example, the Tagged Image File Format (TIFF), developed by Aldus, in its unadulterated form may, or may not, be readable by some image viewers and image editing software. The Aldus TIFF is, however, the most standard format and the one selected for the storage of the RGHC scans.

The Aldus TIFF can be compressed to nearly half its original file size without losing data. This is accomplished with LZW (Lempel-Ziv-Welch) compression. Compression requires a trade-off bytes for seconds. Smaller file size is not the only consideration, it takes time to compress and decompress "packed II image files. With larger files, which one is more tempted to compress, more time is expended in the process. Also, there is a danger that compressed files may be more difficult to migrate to new file formats in the refreshing procedure. Uncompressed files are more likely to have simpler, cost effective, solutions to format migration.

Another type of compression is a valuable time saver when loss of data is not a large concern. The use of JPEG (Joint Photographic Experts Group) compression, together with "sizing" images to monitor quality shrinks file sizes to a fraction of the parent file's size. This is important when speed of access dominates monitor image quality. At RGHC the full-screen browseable images are JPEG compressed files measuring 750 pixels across. This image size fits well on a 17" monitor, but spills over the edges of a more common 15" monitor. It was decided that gearing everything for the least common denominator was not necessary, nor prudent.

An issue regarding monitors is that there is not a standard pixel shape. Macintosh monitor pixels are square shaped whereas PC monitor pixels are rectangular. This means that an image scanned and sized on a Macintosh will appear stretched on a PC monitor. If this is a problem, there are software solutions to correct it.

Equipment/Expertise

Having progressed through the Rationale and Approach stages one should have a good idea of what access tools, scale and output products are desirable. In the Equipment/Expertise stage the archivist will look at what equipment is available to meet his or her needs and what kind of technical support will be required. Additionally information on costs can be gathered.

When looking at equipment needs one should review the Approach chosen. Will the archives staff be scanning 100 images or 100 thousand? Probably somewhere in between. If the need is to scan a small group of photographs, say 50 to 500, then a large number of manufacturers are offering economical equipment. A look at the equipment that is already available in the office may reveal that the computers at hand will be adequate for low volume scanning. If, however, the plan is to do a large volume of scanning, it may be in best to investigate new, dedicated equipment.

There are Macintosh lovers and haters just as there are PC lovers and haters. The word computer "platform" must have been borrowed from the concept of a political "platform" to illustrate the oppositional attitude. When looking at the possibility of purchasing new equipment, it is best to separate oneself from passionate feelings for one or the other platforms and really compare. Evaluation of the actual computers, the software, and the peripheral devices is easy say, but is not easily done. The manufacturers and vendors of equipment want consumers to buy their products so they provide information that places their equipment in the best light

when compared to similar equipment. For example, the advertisements describing scanner specifications may not have enough similar information to adequately evaluate and compare products.

As demonstrated in the FEAR decision making process, there is no one best solution to everyone's needs. Each situation is unique. Secondary storage is no exception. The issues of scale and access points contribute to deciding which storage media may be most suitable. Also, depending on the decisions made about equipment in the next FEAR stage, Equipment/Expertise, the resources existing at hand may provide the only alternatives. A few images scanned for the archives Web page can be stored on a hard drive and backed up on a few diskettes. Many images may require more storage capacity and a look at magnetic tape, Magneto-optical discs or CD-ROM storage.

All of the secondary storage alternatives have drawbacks. Magnetic tape is attractive because backup tape drives are common and inexpensive. The tapes can now hold a couple of gigabytes of data. One problem is that magnetic tape only provides sequential, not random, access. This is fine for backup-type applications; however, if an image file is located at the end of a 120 meter tape it takes time to get to the location and then transfer the data. When working with large image files time becomes an important issue.

Speed is the big advantage of Magneto-optical and CD-ROM storage. Magneto-optical drives are proprietary devices. Aftermarket media often cannot be used in any two brands of drives. CD-ROM appeared the best way to go for the RGHC's system.

Two aspects concerning the advantage of CD-ROM were important. First, standards exist for both the manufacturing of the CD-ROM writing equipment and the blank CD-ROM media. Second, there is an international standard, ISO 9660, which provides for the creation of non-platform-dependent CD-ROMs. For example a CD mastered by a Mac-compatible recorder in the ISO 9660 format can be used on any Mac, PC or UNIX platform computer that has a conventional CD-ROM drive. Also, CD-ROM recorders have become more affordable. This is bringing a large consumer market into the CD mastering world and is lowering the cost of the CD media as a result.

It is a good idea to consult with others who have experience with digital imaging and to involve the organizations technical support staff. These people may be experts/or know others who are experts. Exploit their knowledge and talents. Outside consultants can help those lacking internal technical support. They can provide advice and training, and can be the equipment vendors themselves, however, be wary of the potential for conflict of interest.

An alternative that can be considered is outsourcing the scanning to a service bureau or imaging specialist. Factors to be examined include the volume of images -- whether there are too few to merit purchasing equipment or too many to be cost effective. An additional factor is the loss of control that archivists fear when unique materials are out of their physical custody. A tight contract with detailed specifications is mandatory. Whichever route is taken, it will cost money.

Funding

The Funding stage is what brings all previous frustration and work to fruition. A complete funding budget could include equipment, labor, storage media, maintenance, training and support. Additionally, a commitment to the future migration and refreshing of the digital image files could be included. These costs are more difficult to get a handle on, but for planning purposes could be based on the current costs of media and labor.

It is good to have fear if it works towards positive results. Possibly the greatest fear one might have in a large-scale digital imaging project is the potential for being criticized in the future for decisions made today. The attitude held by the RGHC staff is that as long as our actions are directed by informed decisions based on standards, others' practices, and personal experiences, digitizing of selected photograph collections more likely will be praised than ridiculed in the future.