

Archives Conservation Discussion Group 2011: Digitization and Its Effect on Conservation Treatment Decisions: How Has Wide-Spread Digitizing of Collections Changed Our Approach to Treatment?

ABSTRACT

In line with this year's AIC theme: ETHOS, LOGOS, PATHOS: ethical principles and critical thinking in conservation, The Archives Conservation Discussion Group 2011 examined the impact of providing digital collections in museums and libraries, and their conservation implications. Presentations and a subsequent discussion covered topics such as: How conservators are balancing ethical concerns, especially as dictated by the AIC Code of Ethics, with increased demand from digital projects. How conservators are keeping pace with large-scale or fast-paced digitizing projects, while maintaining standards. And the impact of limiting access to original materials by providing digital surrogates and its effect on treatment decisions.

INTRODUCTION

The 2011 Archives Conservation Discussion Group (ACDG) met in Philadelphia on Thursday, June 2, to discuss the role of conservation in digital projects. Given the scale and pace of today's digital projects, it is a complex challenge for conservators to keep up with even basic stabilization of materials while maintaining quality standards. Participants discussed adaptive stabilization techniques for a range of materials and outlined preventative measures for safe handling throughout the process. The co-chairs for ACDG invited five conservators working on very different projects from various institutions to share their experiences. The speakers covered a broad range of challenges and solutions. In addition to their presentations, some of the participants provided handouts with

This open discussion took place during AIC's 39th Annual Meeting, Philadelphia, PA. The moderators organized the panelists, led the discussion, and recorded notes. Readers are reminded that the moderators do not necessarily endorse all the comments recorded and that although every effort was made to record proceedings accurately, further evaluation or research is advised before putting treatment observations into practice.

further information and resources and ended with a question and answer session. A summary of each presentation and the resultant discussion are provided below.

ANDREA KNOWLTON

GRAPPLING WITH TREATMENT DECISIONS FOR LARGE-SCALE DIGITIZATION OF ARCHIVAL MATERIALS

ABSTRACT

With only two conservators serving a collection of over 500,000 rare books and more than 20 million manuscripts, the conservators at UNC-Chapel Hill's Wilson Library have always had to make difficult decisions about treatment priorities. As technology shifts modes of access and curatorial priorities change, expectations for conservation treatment in a research library are changing. Over the past two years, the digitization model in Wilson Library has begun to shift from curated, grant-funded projects to large-scale digitization of entire collections integrated into normal library operations. In 2009, the Southern Historical Collection at Wilson established a new program with the aim of digitizing all of its 16 million manuscripts. We struggled to come up with a treatment approach that would allow us to adequately prepare large numbers of materials for digitization. Ultimately, in the context of digitization, we have come to accept a very minimal approach to the treatment of archival collections. Turning to the Code of Ethics to evaluate our decisions, we believe we can reconcile this approach with our professional obligations and still meet the needs of the 21st-century research institution. At the same time, this has required a shift in our understanding of our role as conservators.

INTRODUCTION

The Special Collections Conservation Lab at the University of North Carolina at Chapel Hill serves five collections, all housed in Wilson Library, including the Southern Historical

Collection (SHC), a large archival collection comprised of nearly 16 million unique primary sources. With just two conservators to meet the conservation needs of all of the special collections, we have always had to make difficult decisions about where best to utilize limited resources. The complexity of these decisions has been compounded by the demands of a growing digitization program.

In 2009, following a two-year Mellon-funded study of scholar and patron needs, the Southern Historical Collection launched the Digital SHC. This initiative was conceived as a new, ongoing program to be integrated into normal library operations—not a stand-alone project. The long-term goal is to digitize all 16 million items in the collection and make them accessible online. To achieve this, individual collections in the SHC are digitized in their entirety, with images linked through the online finding aids. To date, approximately 170,000 items have been scanned for the Digital SHC. This program is affectionately known as the “Trickle”, which represents the continuous nature of the digitization stream.

The large-scale approach of the Digital SHC mirrors a growing trend in special collections. Digitization efforts are shifting from highly curated digital projects, often funded by grants, towards large-scale digitization of entire collections, emphasizing access through dramatic increases in quantity. Numerous recent publications highlight this shift. A recent OCLC report titled “Taking our Pulse: The OCLC Research Survey of Special Collections and Archives” includes the development of new models for large-scale digitization as one of thirteen essential actions to transform special collections in this time of changing technology and scholarship. A second report, “Rapid Capture: Faster Throughput in Digitization of Special Collections,” promotes methods to increase both the speed and scale of digitization. It seems this trend is only likely to increase, and may play an integral role in the continuing relevancy of special collections.

For any conservation lab, a large-scale approach poses numerous challenges, and perhaps even more so when a project becomes a program, as in the case of the Digital SHC. Grant-funded projects offer the opportunity for funding to support project conservators or technicians. With today’s tightening budgets, additional conservation staffing to support a new digital program is often not possible. Also unlike a thematic project, when the goal is to digitize collections in their entirety, we cannot ask curators to consider a substitute if a selected item is too fragile to scan.

As scanning was to begin for the Digital SHC, we were suddenly faced with the question of how to deal with boxes and boxes of materials with potentially significant conservation needs prior to scanning. The Trickle suddenly felt like a flood, and it was clear that the Conservation Lab had the potential to be a major bottleneck in the operation. Although we have a strong history of project-based digitization in Wilson Library,

this was a brave new world, and it was clear our approach to pre-scanning stabilization would have to change.

TREATMENT APPROACH FOR LARGE-SCALE DIGITIZATION

As we worked through how and when we would be involved and the degree of stabilization we would undertake, we noticed that some of our own preconceptions about what conservation is and what conservators do would need to be reconsidered. Our self-questioning was also shaped by our awareness of common practices in other institutions and perspectives we had seen in the literature.

The scale of the program was our first stumbling block. Conservators are detail people. When thematic digitization projects featuring a group of selected items was the norm, many conservators, including us, have taken the approach of examining all items before, and sometimes again after, digitization. As digitization scales up, this is simply not possible. Since curatorial staff go through collections in detail to collect other kinds of information for the scanning workflow, we see no reason to duplicate these efforts. Instead, we have trained staff to identify items in need of conservation before scanning, erring on the side of sending too much rather than too little. Any folders with items in need of repair are sent to the Conservation Lab, several boxes at a time, in an ongoing workflow devoted to the Trickle.

We weren’t sure at first how well this process would work. For past digital projects, we have always completed quick, informal surveys of the proposed collections ourselves since it does generally require a conservator’s eye to estimate treatment timelines. But for an ongoing program like the Trickle, the process has worked remarkably well. Collections with significant conservation needs can simply be pushed back in the scanning queue until treatment is complete.

Once the materials were in the lab, we had to develop a feasible range of treatment that would work for the kinds of materials we typically see in SHC collections, including manuscript letters from the 18th to 20th centuries, typescripts, oversized documents (like indentures), ledger bindings, and journals, to name a few.

We first considered the influence of our scanning set up. All scanning is completed in-house in our Digital Production Center (DPC) using two Zeutschel overhead scanners. I personally train all new scanning technicians in safe handling of special collections and in the identification of potential problems that could arise with digitization. Because of the lab’s proximity to the DPC, we are also able to maintain a close, on-call relationship with the scanners in the event that questions come up during scanning. Although we have heard the idea that scanning technicians cannot be trained to be adequately careful, this has not been our experience.

Ultimately these factors led us to adopt a very minimal approach to stabilization with a basic goal of ensuring safe handling and legibility. Most of the work is carried out by student assistants working under the supervision and guidance of the two conservators. Individual items are surface-cleaned only if the dirt obscures text or has the potential to rub off on hands or equipment. Only tears that are likely to become worse with handling are repaired. We roughly define this as tears greater than 2 cm in length, along folds, or extending into the text or image area.

In a 2003 article, Helen Lindsay of the London Metropolitan Archives describes treatment for “once only” handling by a scanner, which closely resembles our approach. Essentially we are only doing enough repair to allow a scanning technician to safely place an item on the bed of the scanner and return it to the folder. This is a bit of a moving target, and varies with the type of paper and location of the tears. But when working from this perspective, fewer and fewer repairs really seem necessary to protect the integrity of the page. The result is that we are now doing far fewer repairs than when the program began, and many items leave the lab with some tears still in place. We do, however, try to strike an appropriate balance so that scanners can work safely at a reasonable speed without having to take extreme measures for damaged documents. More than any other issue, the question of what to repair has required a significant adjustment in our thinking and expectations and has been a catalyst to thinking about our changing landscape.

We have seen numerous references in the literature from both the conservation and library communities to what appears to be a widely held belief that digitization of a collection increases requests for its use in the reading room. Some conservators have argued that we need to treat items that will be digitized not just for scanning, but with this increased use in mind. In our institution, we have not seen evidence to link digitization with increased use onsite. If digitized collections do come through the reading room and are found to be too fragile to use, we can address conservation needs through other existing workflows.

For the average document, repair takes only a few minutes per page. Of course there will always be some items that require more complex repair, such as an 18th century indenture received in small pieces (figs. 1–2). Such items require significantly more time, and treatment may be carried out by one of the conservators, although the example shown here was repaired by a student.

Other than basic page repair, there are several typical problems that we encounter time and again in these collections, and over time we have adopted practices that streamline preparation. Extremely brittle items and those with extensive losses due to mold, insect, or iron gall ink damage are housed in Mylar and scanned in the sleeve.



Fig. 1. Before Treatment: 18th century indenture



Fig. 2. After Treatment: Indenture stabilized for digitization



Fig. 3. Documents with attachments often require special instruction to the scanning technician



Fig. 4. A manuscript letter with severe iron gall ink damage is one of just two items rejected for digitization by the conservators

For complex items, such as indentures or legal documents with multiple layers or attachments that cannot or should not be separated, we rely upon extra instruction to the scanning technician to ensure the image is captured without incurring damage (fig. 3).

We are very fortunate that most of the bound volumes require little intervention in order to be scanned using available equipment. The vast majority are ledger bindings, which were originally constructed to be opened flat for use. This allows for easy capture with the overhead scanner. If journals and other bound volumes do not open flat, a cradle can be fitted to the Zeutschel to support the binding. Just as we do for flat documents, we tend to limit repair to major tears, rarely needing to address structural problems, and we find this is usually sufficient for safe scanning.

Very few items are in such poor condition that we cannot justify even the minimum treatment required to make them safe to scan. The document shown in figure 4 is one of just two examples that we have rejected for digitization since scanning for the Digital SHC began. As you can see from the image, this letter would have required a great deal of treatment for very little gain. The letter was virtually illegible due to the extensive strike through and drop out of the iron gall ink on thin, brittle paper, so it seemed unlikely that we would be able to attain a legible scan even with time-consuming treatment.

In the context of this project, we typically do not remove pressure-sensitive tape. We might remove previous repairs of other kinds, like glassine tape for example, if they can be easily removed, and if they obscure image or text or complicate repair due to misalignment.

Because of this minimal approach, many of the documents post-stabilization do not look like objects that have just undergone treatment. Of course we all know that treatment does not always improve the aesthetics of an item, particularly for archival collections, and we can expect stabilization to do even less. Initially, we grappled with a sense of embarrassment that having such images on our website would be seen as a reflection of our care for the collections. But more significantly, I believe this also touches on a deeper issue.

Very minimal, partial repair is not what our conservation training prepared us to do. We took this approach of “least possible” stabilization for digitization somewhat out of necessity and desperation, and initially it felt wrong. Was this an issue of conservation changing with the times, or being pushed onward and downward?

We turned to AIC’s *Code of Ethics and Guidelines for Practice* to examine our decisions. Many sections of the code, guidelines, and commentaries touched on some aspect of our approach to conservation for the Digital SHC program, but Commentary 20 on preventive conservation, Commentary 21 on the suitability of treatment, and the commentaries related to documentation provided the most insight as we examined the procedures we had put in place.

It is clear from what I have described that we have established a strong preventive conservation component to the Digital SHC program that easily meets the requirements for the development of policies and procedures for the safe handling and use of collections outlined in Guideline 20 on preventive conservation. We have played an active role in training curatorial and scanning staff, and we regularly advise on appropriate digitization workflows and suitable scanning equipment.

Many of the special practices described in the commentaries to Guidelines 24–28 on documentation relate directly to the kind of mass treatment of similar items that we are doing for the digitization program. We meet the requirements by maintaining basic documentation for all treatment completed as part of the Trickle workflow, including a group treatment proposal approved by the curatorial liaison and a record of treatment and materials used for each individual collection. Any variation from the routine is documented. If individual items call for treatment beyond the established procedure, we consult with the liaison and produce additional documentation if warranted by further treatment.

Guideline 21, which addresses suitability of treatment, recognizes that conservators work within a broad continuum of care and must consider a range of factors for any treatment, including available resources and institutional priorities.

Although we have heard some conservators question whether stabilization for digitization is really “conservation”, based on this guideline, I am firmly convinced that it is. We are not lowering our standards. We are simply doing less. As we developed the treatment protocol for the Trickle, we sought to identify the point on the conservation continuum that would be adequate for safe scanning given the variables and context. We carefully considered all aspects of the scanning workflow, such as staff training and equipment, as well as the resources available, the priorities of our institution, and competing needs for our time. We found Guideline 21 and the associated commentaries to be particularly relevant to our decision making for the Digital SHC program in the context of both our broader conservation program and our institution as a whole.

CONCLUSION

Certainly there are benefits to our approach. We retain conservator time for complex treatment of materials used in other contexts, whether in the reading room, on exhibit, or for instruction, another growing priority for special collections in academic libraries. Our cooperation with the Digital SHC is also an important piece of the collaborative relationships we maintain with our colleagues in Special Collections. By taking a pragmatic approach, they see that we are working with them to achieve common goals—in this case, to increase access to our collections. We believe that our practical approach means that they continue to involve us in the process and in decisions that have the potential to affect the well-being of the collections. And on the rare occasions that we must say no to the proposed use of a particular item, they understand there is sound reasoning behind it.

Recognizing the benefits gained, we believe we have finally hit the right mark on the conservation continuum for the Digital SHC. As we manage the conservation program as a whole, we work to maintain a careful balance between full treatment and minimal intervention in order to meet the needs of all of the collections in our care. At the same time we must embrace the new realities of special collections in the 21st century if we are to retain our relevancy within our institution. Ultimately, we view the role of conservators as that of facilitators to help make access happen—to advise, train, and treat so materials can be made available to as wide an audience of potential users as possible without sacrificing long-term preservation goals.

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REFERENCES

- AIC. 1994. *Code of ethics and guidelines for practice*. Washington, D.C.: American Institute for Conservation. www.conservation-us.org/index.cfm?fuseaction=page.viewPage&pageID=858&nodeID=1 (accessed 05/16/11).
- AIC. *Commentaries to the guidelines for practice*. Washington, D.C.: American Institute for Conservation. www.conservation-us.org/index.cfm?fuseaction=page.viewpage&pageid=529 (accessed 05/16/11).
- Dooley, J. M., and K. Luce. 2010. *Taking our pulse: The OCLC research survey of special collections and archives*. Dublin, Ohio: OCLC Research. www.oclc.org/research/publications/library/2010/2010-11.pdf (accessed 04/15/11).
- Erway, R. 2011. *Rapid capture: Faster throughput in digitization of special collections*. Dublin, Ohio: OCLC Research. www.oclc.org/research/publications/library/2011/2011-04.pdf (accessed 5/16/11).
- Lindsay, H. 2003. Preservation microfilming and digitization at London Metropolitan Archives: Surveying and conservation preparation prior to image capture. *The Paper Conservator* 27(1): 47–57.

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IS STABILIZATION CONSERVATION? TREATMENT OF OVERSIZE MAPS FOR DIGITIZATION

The CONSOL Energy Mine Map Preservation Project is funded collaboratively by CONSOL Energy, the Department of the Interior’s Office of Surface Mining, the Pennsylvania Department of Environmental Protection (DEP), and the University of Pittsburgh. The goal of this ongoing project is to stabilize a collection of approximately eight hundred maps for digitization, so that detailed images of the maps can be made available to the public on the internet. The project is now in its fourth year. To date, the Conservator and as many as eight student assistants have cataloged, surveyed, and stabilized over 400 maps for digitization. In 2011, there are plans to hire a full-time conservation technician to assist with the ongoing project.

Mining operations have been underway in Pennsylvania since 1760, and the southwestern portion of the state is riddled with abandoned mines. Laws requiring drawing up a map of a working mine did not take effect until 1850, and even then regulations requiring that these maps be saved were not strictly enforced. The impetus for the CONSOL Energy Mine Map Preservation Project came in 2002, when nine miners were trapped underground for four days in Somerset County, PA, after breaching an old mine that had

filled with water. Although all nine miners were eventually rescued safely, the entire ordeal could have been avoided if a map of the abandoned mine had been preserved. Knowing the locations of abandoned mines would also help avoid structural problems faced by property owners in this area, such as sinkholes under a driveway or foundation caused by break-through into an old mine shaft.

Maps are cleaned and stabilized at the University of Pittsburgh Preservation Department and are then transported to the National Mine Map Repository (NMMR) in Greentree, PA, to be scanned. Physical maps are returned to the University of Pittsburgh's University Archives for permanent storage. Access to the digital surrogates of the maps is available to the public online. The digitized maps are used by homeowners to determine whether they need Mine Subsidence Insurance (offered by the Pennsylvania DEP), by land reclamation projects, by the Bureau of Mine Safety, by engineers involved in gas exploration and new underground mining operations, and ultimately for the protection of miners, the public, and the environment.

The maps are oversized manuscript "hardbacks," meaning they have been hand-drawn on heavyweight paper adhered to canvas. The dimensions of the maps are, on average, five feet high by ten, twenty, or thirty feet wide. The maps date from approximately 1860–1950. Common damages include maps too brittle to unroll safely, tears and breaks, surface dirt, water damage, stains, and mold. Most of the maps have been previously mended with pressure-sensitive tape, which must be removed for a clear digital scan. The scan area of the Cruse Table Scanner CS 285/1100 ST/FA measures 58" x 90" with a dpi of 220 to 630. The scanner is equipped with a suction table to encourage the maps to lie flat for imaging. Since the maps are larger than the scanning bed, they are scanned in sections and then digitally stitched together in Photoshop. The maps must be compacted for transportation to and from the scanning facility because they are too large to be transported flat in the DEP's van, which measures 58" x 76". However, since re-rolling frequently causes problems such as creasing, tenting, and releasing from the backing, it was determined that, in some cases, sectioning the maps and re-lining them in sections to accommodate the necessary transportation needs of the project was a preferable course of action. Sectioning the maps and transporting them flat puts less stress on the paper, and provides a flatter, uncompromised surface for scanning than re-rolling for transport.

What "stabilization for scanning" means within the scope of this project:

- Maps must present a clear image so mine workings can be seen
- Maps must lay flat (with assistance such as suction or plexi weights)
- Maps must be safe for handling, transportation, and storage

To achieve a clear image of the map, the conservation team dry cleans surface dirt, wet cleans grime with poultices, washes when necessary, and removes tape where it is obscuring media. They humidify and flatten the maps, mend tears to pull the maps flat, and also re-line the maps. To ensure that the maps are stable for transportation and storage, the conservation team mends tears that may snag and constructs protective housings to protect the maps from rough handling and potentially inclement weather. Everyone who handles the maps along their route to scanning and then back to the University of Pittsburgh for permanent storage receives yearly training on safe handling practices.

Use of the physical maps has, unexpectedly, increased over the course of the project. Even though the maps are enormous and unwieldy, some people simply prefer using the physical maps to their digital surrogates.

Philosophical questions which have caused Baker concern during the course of this project include:

- Is this merely "preservation triage"? Is conservation no more than a by-product of digitization?
- Is the technology dictating the treatment parameters? Should a higher level of conservation treatment be demanded for digitization?
- Are stabilization and conservation treatment different? Is stabilization just one aspect of conservation treatment? How can this be categorized?
- How can the AIC Code of Ethics guide stabilization efforts as well as full conservation treatment? What level of treatment is ultimately acceptable?

The treatment for these mining maps ultimately follows these ethical guidelines:

- Stabilization treatments are reversible insofar as it is possible
- The materials used do not adversely affect the objects
- The information content of the maps is being preserved
- Although the physical object is, in some cases, being altered, documentation keeps a reliable record of these alterations

The conservation team strives to find a balance between the time-pressures of the mining industry, treatment of the physical artifacts, the scanning technology, transportation restrictions, and access issues. The satisfaction of all parties involved indicates the overall success of the project to date.

Amy E. Baker, Conservator, ULS Preservation Department, University of Pittsburgh

STEPHANIE JEWELL

DIGITIZATION AT THE WALTERS ART MUSEUM: ISLAMIC AND WESTERN MATERIALS

The Walters Art Museum recently finished a two year digitization project of Islamic material and is currently in the middle of a second two year project digitizing Western material, both funded by the National Endowment for Humanities. The Islamic digitization project included 128 codices and 114 single leaves and the Western project includes 102 codices, 19 single leaves, and 3 scrolls; a total of 366 objects to be digitized over the span of four years.

The goal of the digitization project is to create a digital resource made of full digital surrogates of the illuminated manuscripts in the collection of the Walters Art Museum in order to preserve, archive, and provide universal public access to the museum's collection. The overall project includes three main components: examination and treatment by conservation, the digital image capture, and documentation with metadata. Every digital image is accompanied by the manuscript title, author, scribe and date of creation. The images are stored on the Walters Art Museum database and will also be available through various portals including ArtStor, the Index of Christian Art, and Digital Scriptorium. Jewell discussed the organization and implementation of the conservation component of the project.

The equipment chosen for the image capture was an important part of the project and one that would influence treatment decisions over the course of digitization. At the beginning of the 2008 NEH Islamic digitization project, an imaging system was acquired by the museum. Several systems were reviewed by the conservation and curatorial departments and The Stokes imaging system was acquired. The digital capture of the images is done by two dedicated digitization technicians using the Stokes System. The system consists of a camera mounted at a fixed position and a pneumatic vacuum wedge on the opposite side that is lowered to support each leaf. The camera and wedge are positioned so that every folio is photographed at a constant focal place. The book cradle adjusts to the weight distribution of the manuscript, supporting the book in a manner that minimizes the stress and strain to the binding. The folios are turned manually by the technicians and the wedge is lifted and repositioned before every image is taken. The system serves both the mission of the institution and the grant project by protecting the rare manuscripts with its methods of reducing the strain to the objects and producing high-resolution archival quality images. To date, nearly 54,000 raw images have been captured. Additionally, the sensitivity of the cradle to support the manuscripts directly influenced some of the treatment decisions made by the conservation staff prior to digitization.

At the beginning of the Islamic digitization project, an intern in the Book and Paper conservation lab conducted

a survey of the manuscripts and created a database using Microsoft Access. The database included information on the binding, materials, condition, and exhibition and treatment history of the manuscripts. This database not only serves the purpose of organizing key information to structure treatments for digitization but has also formed a digital resource of information on the structure, condition, past treatment, and exhibition of the manuscripts. The initial survey produced a rough time estimate for treatment grouping manuscripts into four categories; good, fair, poor, and dire. The database made it possible for the conservation staff to easily keep track of the manuscripts in need of treatment and to record the treatment done on each manuscript prior to digitization. This tool enabled proper documentation in an organized format that could be done efficiently, keeping with the fast pace and time constraints.

A second condition survey was carried out half way through the project. At this point, the imaging was going much more quickly than the treatment of manuscripts and further condition information was necessary to properly organize and prioritize treatment. This survey organized the manuscripts into five categories using a number system, one being in the best condition and five the worst. The manuscripts in categories four and five were reviewed together by a conservator and the curator to set treatment priorities and discuss treatment options and risks of putting heavily damaged manuscripts through the process of digitization. As a result of this second survey, a few manuscripts were removed from the project due to the complexity of their condition and treatment needs.

The treatment of the manuscripts can be broken into two categories. The first category, necessary treatment, were treatments undertaken to every folio of every manuscript before digitization. These treatments included media consolidation, tear repair, the stabilization of damage caused by copper containing pigments, the reattachment of loose leaves, the stabilization of broken sewing, and the stabilization of split joints. Possible treatments were treatments that would be carried out if necessary. For instance, many of the manuscripts had insect damage in the central areas of the folios. These damages would not be affected by the vacuum pressure of the wedge and were not in risk of becoming worse. Loose sewing without an access point with which to anchor it was carefully assessed in order to determine if the manuscript could withstand digitization without exacerbating the problem. The sensitivity of the Stokes system made it possible to digitize some of these manuscripts without what might be considered as a full treatment.

Remoistenable tissue was the primary mending material used for edges tears, insect damage, and damages caused by copper containing pigments. The tissue can be reactivated on a wet tile prior to application or in situ with a brush application of moisture or a 50:50 water/ethanol solution. This

method of mending introduces less moisture than a wet paste method and requires significantly less drying time. The repairs are suitably unobtrusive and reversible. The efficiency that this type of repair method allowed was integral in the work flow of the treatment of the manuscripts.

In conclusion, Jewell outlined four main conclusions that came out of the conservation component of the Islamic digitization project at the Walters. The first is that the imaging equipment plays a large role in the treatment decisions made by conservators. Time constraints require an organization of treatments so that they may be timed appropriately and accomplished within the set amount of time as mandated by the project. The database compiled and the beginning of the NEH digitization project and the mid-point survey were integral in the organization of treatments and treatment decisions. Low moisture mending methods allowed for effective and efficient treatment for large scale projects. The last conclusion which was elegantly presented by Gabrielle during the general session is that the decisions made by conservators have to account for the historic value, academic value, safety of the object, and equipment capabilities and time limitations.

Stephanie Jewell, Mellon Fellow in Book and Paper Conservation

AMY LUBICK

DIGITIZATION AT THE NATIONAL ARCHIVES: THE WIDOWS' CERTIFICATES PENSION FILE PROJECT AS A TREATMENT MODEL

The National Archives has approximately 10 billion pages of textual documents. Of the 10 billion pages, 130 million are currently available to view online. Among the various in-house and partnership scanning projects underway at the National Archives is a partnership project with FamilySearch, also known as the Genealogical Society of Utah or GSU, to scan 1.28 million files or 35,164 cubic feet of Civil War Pension Files which Lubick's presentation focused on.

The Civil War Pension files are some of the most frequently used records in the National Archives. Historically, the Federal Government granted pensions to Union Veterans of the Civil War, their widows, minor children, and dependent mothers and fathers. The pension files vary in the number of documents they contain, but one hundred or more is quite common. Each file will contain records for all claims relating to one particular veteran. The project to begin scanning these files began in October, 2007 and is slated to finish in 53 years if scanning continues at the current rate of approximately 30,000 images per week by four camera operators. Given the size and estimated duration of this project, conservation treatment being performed on the records is limited.

The Conservation staff relies heavily on approximately 70 trained NARA volunteers working solely on this project to

review each Pension file and identify records that require conservation intervention. The volunteers also complete a partial arrangement of records, selecting key documents to place at the front of the file. The volunteers will use these documents to fill out a target sheet for each file to aid in indexing and metadata entry. Each volunteer receives 16 hours of National Archives orientation and 10 hours of training specific to this project from the archival unit and conservation staff. The volunteers receive instruction on safe handling of the records, how to identify records in need of conservation and how to place the most fragile documents in polyester sleeves. It is estimated that approximately 2% of the Pension Files will require some sort of conservation treatment.

The records vary in format. The majority are loose textual documents on paper with a small percentage of parchment and photographic materials. Other interesting types of objects found in the files include a fabric swatch and a mole. The fabric swatch was used to identify the corpse of a widowed pensioner. The mole had been the tent mate of a soldier. The soldier sent the mole to his wife as a memento and she used the mole as evidence of her marriage to the soldier when applying for her pension. The volunteers make new and exciting discoveries in these files every day.

The focus for conservation treatment includes:

- Tears that make the records unsafe to handle at the camera.
- Attachments secured with glue, metal fasteners or ribbons that obscure unique information.
- Fasteners and seals with ribbons that prohibit documents from being imaged because they cannot lie flat on the camera platen.
- Oversize materials that exceed the dimensions that may be captured by our partner cameras.
- Unstable photographic materials.
- Files with mold.

When confronted with tears and the question of when to mend them, one of their biggest concerns is new damage occurring to records when the camera operators are imaging the documents. Large tears that already exist in the records before they reach the camera make turning the records over extremely difficult. Their partner camera operators are Genealogical Society of Utah volunteer missionaries extremely devoted to their work and very focused on the number of images they capture every day. The project is a balance of conservation and the custodial archival unit working with the camera operators to ensure they handle the documents with care while the operators capture approximately 5,000–7,000 images each per week. Records with large tears are placed in polyester sleeves or stabilized with mends of Japanese paper and wheat starch paste. They prefer to use sleeves whenever possible to reduce the amount of time spent mending, keeping in mind that the use of sleeves adds weight

and bulk to already overstuffed boxes. Records torn into two or more pieces are mended instead of being pieced together inside a polyester sleeve. This avoids shifting of the fragments within the sleeve that would later force the camera operators to align the fragments under the camera. In trying to hastily piece the records together just prior to imaging, there's a risk the fragments won't be aligned properly or that fragile or brittle records will incur more damage. Whether the records are sleeved or mended, the obvious goal is to align text to increase legibility and ultimately make the record safe to handle.

Currently, they have a team of 5 conservators and technicians working on the pension file project. Lubick emphasized a consistent approach to the treatment of the pension files and the preparation of records for digital imaging in general. This includes a consistent approach to the types of mends performed on records for digital imaging. With each new digital project, a treatment protocol is developed for the particular record series working in collaboration with the custodial archival unit. The protocols differ based on the format of the records. For example, there is another project that involves imaging torn tri-folded records. These records are being unfolded prior to imaging and refolded post imaging. They would not be able to place these records in polyester L-sleeves for stabilization since the records will be refolded so they must be mended. Prior to beginning a new project, the protocol is reviewed with the team of conservators and technicians working on the project. With the understanding of when and whether a record should be mended, the conservators and technicians are free to choose the materials they prefer for mending as long as the mends can be applied quickly and neatly, align text and won't obscure information. The mends don't have to extend edge to edge and may have the appearance of simple band-aids. These partial mends can be applied with more speed than full mends that would require trimming. Once repaired, the document may be placed in a polyester sleeve if additional support of the record is necessary. When they first began prepping records for scanning, they believed the mends needed to only withstand being moved one last time from envelope to scanning platen and back to the envelope; believing the records would not be handled again. But the reality is that the records remain open and continue to be pulled and handled by researchers until the images are available online. This process can take approximately six to eight months.

The majority of conservation treatment steps performed in the lab is repairs followed by separating records that are glued or fastened together in some manner. From the outset of this project, an important objective has been to make accessible unique information contained within these files for researchers viewing the digital images online. For the volunteers prepping the records and reading the documents, they quickly become the experts on the particular files they work on. It becomes their job to let Conservation know if

information hidden beneath an attachment adhered with glue is unique to the file; tabbing it for separation by conservation or making the decision the information is repeated elsewhere in the file and deeming it unnecessary to separate.

This concept of "unique information" is communicated to the researcher through the use of "slugs"—messages that are included in the final image. This slug tells the researcher that the text hidden under the attachment in the bottom left corner of the image is not unique. If the slug wasn't in the image, the researcher would be left wondering what was beneath the attachment and if they were missing key pieces of information.

So far in Fiscal Year 2011, Lubick says that they have spent 603 hours treating 2727 records for the Pension File Project. 1081 records have been repaired and 465 records have been separated to allow access to information. In 2009, they began to keep fairly detailed statistics on the amount of time being spent on treatment for digital projects. This assists with planning for future scanning projects, developing the lab's annual work plan and scheduling staff. The conservation treatment completed for digital projects occurs at both of the DC Area NARA conservation labs located on the Mall and in College Park, MD. The scanning takes place at 3 different locations in the area. Where the records are located and where they are being scanned impacts where the NARA conservators and technicians work to prep the records. Scheduling can sometimes get complicated for the multiple scanning projects they are working on at any given time. Their turnaround time for the conservation treatment of all records for digital prep is approximately one week. Each week, they receive a new cart of Pension file boxes that have been prepped by the volunteers. They also receive a stack of individual pension files from the camera operators containing records stopped at the camera that were overlooked during the initial prep. Like the volunteers prepping the files, the camera operators receive training from the conservation staff on safe handling and identifying items that need conservation attention. The camera operators are instructed to contact Conservation if they come across a problematic record or a document they are uncomfortable handling.

Seals and ribbons present many challenges. As stated earlier, these records have been heavily used so they find many seals that have been previously creased and ribbons that have deteriorated or been removed, although, this actually makes imaging these records much easier than records with intact ribbons. Overall, the Pension file records are in fairly good condition. Because of that, the decision was made to allow the use of weights during imaging. The decision to allow the use of weights with this particular group of records has significantly reduced the number of records requiring conservation attention and has helped us to deal with the many ribbons and attachments that are part of this series.

They allow two different types of weights for use with this project. The first are lightweight drapery weights. The camera equipment used to image these records currently does not employ any type of hinged glass to flatten and reduce distortions inherent to the records. They are performing some humidification and flattening when required to relax creases with hidden text or to flatten oversize items that have been folded multiple times before being inserted in the file. The weights have been helpful in restraining records that may have been folded once along the bottom edge or for taming loose and unruly ribbons. The drapery weights are looped around the ribbons. This technique works only if the ribbons are slightly slack. If they are tied or secured too tightly or if the ribbons are too deteriorated, this technique cannot be used. Two images are typically taken, one with the ribbons pulled in one direction and then a second image with the ribbons pulled in the opposite direction to reveal all text below.

The second type of weights they allow to be used with these records are soft bean bag weights. They purchase the standard 1/2 lb. weights from Benchmark and also have them custom make 1/4 lb and 1/8 lb. weights as well. The bean bags are used when they need slightly more weight applied to the records. They work very well with glued attachments, attachments secured with seals and metal fasteners such as grommets. If an attachment can be carefully rolled back and weighted, this saves the conservation lab from having to separate the attachments. Introducing the weights has been an extremely helpful tool that has reduced treatment time significantly. Bean bag weights can be placed underneath attachments to support them. If the attachments are fragile, torn, stiff or too small to weight, the records will have to go to the lab for separation.

The camera operators are trained to recognize when it is appropriate to use a weight, which type of weight to use and how to properly use it. The NARA prep volunteers are also trained on the use of weights and to look out for the attachment types already mentioned where it would be unacceptable to use a weight. They use mock-ups for training and emphasize that the weights should not be placed on the records in a way that will damage the documents or introduce creases to the records.

There is a small amount of parchment documents in these files, including some that have required mending. Treatment is not performed on parchment documents if all of the unique text remains legible. If mold was discovered in the files by the volunteers, these records are immediately sent to the NARA conservation lab in College Park, MD where they have a dedicated room and fume hood used for mold remediation. The records are cleaned with a Nilfisk vacuum cleaner and soft brushes. The documents are then mended or sleeved in polyester as necessary for imaging.

Although fairly rare, a small number of photographic images have been found in the Pension Files. A daguerreotype

and approximately 3 tintypes have been discovered so far. Conservation treatment on the photographic materials has been minimal. The daguerreotype was in a case that had been severely damaged. The various components were separated, photographed and rehoused in a custom made box for storage apart from the remainder of the file. Removing the photo from the file has been somewhat standard practice. Considered quite valuable, the photos, which are often small in size and loose in the file, are stored in a vault so they won't accidentally disappear from the file. One exception was a tintype which was attached quite securely to the paper document with a metal fastener. The tintype was in good condition and there wasn't any information on the record beneath the photo, so it was decided to leave it attached to the paper support.

The treatment decisions the NARA conservation staff make for digital projects allows for access to information and safe handling of the materials. They believe the role of conservation is critical to the digital imaging process and not just in performing conservation treatment.

Amy Lubick, Conservation Digitization Coordinator, National Archives (NARA)

BILL HANSCOM

HARVARD'S CHINESE RARE BOOK DIGITIZATION PROJECT

Commenced in January 2010, the Chinese Rare Book Digitization Project is a 6-year, access-driven project organized between Harvard-Yenching Library (HYL) and the National Library of China (NLC). The aim of the project is to digitally image HYL's entire collection of Chinese rare books: holdings comprising nearly 52,000 volumes and one of the largest collections of its kind outside of China. More than one-third of the titles in Harvard's collection are not available at NLC. During the project, the images will be concurrently made available to the public through web access in both the United States and China.

The holdings of the HYL Chinese Rare Book Collection span from the Song Dynasty (960–1279) through the Qing Dynasty (1644–1795), with the majority of holdings from the Qing and Ming (1368–1644) dynastic periods.

The majority of the volumes—or, more accurately, *fascicles*—being digitized have been bound as the traditional side-stitched structure. The paper sheets which make up the fascicle have been printed on one side and then folded in half with the printing facing outward. The folded sheets have been stacked in order, with the fold at the fore edge, and then bound at the raw edge. The books have two bindings: an inner binding of twisted paper (in a few variations), which is passed through holes punched into the text block; and an outer binding of thread, usually silk, with its own set of holes. The inner, paper binding serves as the structural support for

the text block when it is trimmed at the head, tail and spine edges before the covers are added. The thread binding attaches the covers to the text block. Chinese books use a 4-hole binding pattern for the thread binding. Covers are usually of flexible brown or blue paper.

The workflow for this project consists of three main staff groups: (1) dedicated staff at HYL; (2) Imaging Services staff (IS); and (3) Weissman Preservation Center staff (WPC). HYL staff pulls and superficially reviews all fascicles. Items deemed “camera-ready” are batched and sent to be imaged, while those requiring further preservation review are flagged and set aside for WPC staff to assess at HYL. Once reviewed, the fascicles will either be sent to WPC for treatment, or to Imaging Services for digitization or quick repair. Items sent to WPC for treatment are returned to HYL for batching after treatment. Camera-ready materials are reviewed, page by page, by Imaging Services staff and flagged for quick repair (disbinding, minor mending, etc.) or entered into the imaging workflow. At least two camera stations at Imaging Services are dedicated full-time to the project. WPC staff visit Imaging Services at least once a week to attend to materials flagged for on-site, quick repair. Materials which have been sent to Imaging Services flagged as camera-ready, but which are later found to be too damaged to undergo imaging, are transferred from Imaging Services to WPC for treatment, and then returned for imaging.

The main concerns of the Imaging Services staff are those of safe and efficient handling of the materials and obtaining images that optimize the readability of the text. Fascicles must be free of damage that obscures text or inhibits handling (such as insect damage where adjacent leaves catch on each other). Due to the specifically designed camera set up, in which two pages are imaged at once, the fascicles must be able to open to 180 degrees with enough room between the text and gutter for all characters to be captured. A quota of 45,000 images per month, shot and delivered to Beijing, must also be met.

The goals of WPC staff are to minimize the possibility of damage from handling during the imaging process and to facilitate capturing the best possible image of the text. Due to the high volume of material, treatment emphasizes stabilization over full treatment. Materials and techniques have been carefully chosen to help minimize treatment time while maintaining high work standards. Common problems and the standard treatments devised to address them include:

- Text Inside Gutter: Thread binding is removed and often the paper binding as well; loose thread loops are inserted to keep fascicle together; the fascicle is re sewn with new cotton thread after imaging.
- Broken Sewing: Depending on the stability of sewing, thread is removed and replaced with cotton thread, or existing thread is reinforced with new thread.

- Insect Damage/Tears: Damage is stabilized with remoistenable tissue prepared using a 1:1 mixture of methyl cellulose and wheat starch paste; mends are dried under weight and “blotter boards” constructed of hollytext, blotter, and gray/white board.
- Creases Obscuring Text: Creases are locally humidified with deionized water & dried under weight and blotters.
- Leaves Folded in Prior to Binding: Fascicle is disbound enough to fold leaf into proper position, then rebound.
- Brittle Covers: Old covers are removed and new covers and end-papers are constructed and attached.
- Partial Leaves: A backing sheet of oriental paper of a comparable tone is cut to fit the fascicle and temporarily inserted under the partial leaf during imaging.
- Split Fore-edge Folds: Not treated; fascicles are flagged to alert camera operators who are trained to address the issue.

In the first year of this project, Imaging Services captured 623,101 images, comprising 1,246,202 pages within approximately 8,200 fascicles. Approximately 1,300 of these fascicles (16% of total fascicles imaged) received over 550 hours of treatment combined.

Due to the scale of the project, treatment compromises have proven to be unavoidable in order to maintain both standards of readability and imaging timelines. The most significant of these compromises is the disbinding of thousands of fascicles over the span of the project and the removal of potentially original binding materials as a result. In order to retain a portion of this information, samples of removed binding materials are collected for curatorial records. Additionally, the paper binding, which contributes to the structural strength of the fascicle, has been eliminated from the post-imaging rebinding process. Given that patron access to these materials will likely decline with the creation of digital surrogates, the deficiency in the strength of the binding was weighed against the time saved, and determined to be acceptable when devising treatment protocols.

There have been instances when, despite the mandate for readable text, we have advised against disbinding. The most common example of this are fascicles that have previously been treated using a traditional conservation structure called “jade-edged-in-gold,” in which the original material is supported with new paper in such a way that disbinding the book would make it difficult to handle during imaging, as well as to rebind afterward. The other exception is textblocks that are so brittle that the material in a disbound state is much more unwieldy to handle than when bound. In the majority of cases, these exceptions have been approved by the National Library of China.

Bill Hanscom, Project Conservation Technician, Weissman Preservation Center, Harvard University Library

QUESTION & ANSWER SESSION

Q: *Jamye Jamison, Intermuseum Conservation Association*: Do you have any experience with the reverse of what you have all been discussing? Most of the situations you are describing are digitization-driven, and I am wondering how you treat objects that come through the conservation lab if it becomes appropriate at some time during the treatment to digitize them. So, for example, if a book is in the lab for treatment, and it would be safer to digitize the book while it is unbound, do you then take that opportunity to digitize that book?

A: *Andrea Knowlton*: That has been done in our lab on a couple of occasions in the course of treatment, and because we have a relatively small-sized institution, with such a close relationship with the DPC, we were able to arrange for digitization at the proper point in treatment.

Q: *Anna Friedman, Smithsonian Institution Archives*: How do you deal with not knowing what you have, to scale the work towards?

A: *Amy Baker*: When we began our map project four years ago, our inventory was 650 items. As we went along, we realized there were maps rolled inside of maps, and sometimes there would be thirteen maps instead of just one in a roll. So, our inventory has grown to be close to 800. Also, there are other items presumed to be on the shelves, and it is my responsibility to locate those.

Q: *Suzy Morgan, Syracuse University Library*: My question is for Amy Baker. So, originally you thought that use would go down for the original maps, but it seems like the opposite, that you're getting more use. In light of that, have you considered storing the maps rolled versus having them flat in flat files, given the concerns about rolling and unrolling and the damage that causes?

A: *Amy Baker*: I think use has gone up because we're more public now, we've been featured in some newspaper articles, and we have a website. We originally started showing them rolled, and we have had a few occasions where a patron has come in to look at a map that was rolled, and we've had to re-humidify it to get it flat again. We've taken such care to get them cleaned and pressed flat, and the reality is that they can't be stored flat in one piece due to their size. We are going to start sectioning more of them to store flat. It also costs much less to store them that way.

Q: *Christine McCarthy, Yale University Library*: I have a question for Bill Hanscom. I was wondering about how selection is done, either for quick repair or for treatment by the Weissman Lab, and who in fact makes that selection?

A: *Bill Hanscom*: Initially, it's done by the staff at the library. They have been trained to identify damage that can be dealt with in quick repair, and anything that they may have

a question about they can send to the conservation staff. Imaging Services have also been trained to identify what qualifies for quick repair and what is too extensive. They also know pretty well from experience what their cameras can handle, what their camera operators can handle as far as turning pages and so on.

Q: *Mariëka Kaye, The Huntington Library*: I have a couple of questions. I'm wondering if these kinds of projects require formal conservation surveys to be performed first. And also, I've worked places where, even though people have been trained to handle the items, the conservators still have to sit there and watch the scanners and people doing the photographing, and it takes up a lot of staff time. Have any of you had to do this?

A: *Stephanie Jewell*: In answer to your first question, our project did include a condition survey at the beginning, and I found that helpful having come into the project halfway through. The survey was also very helpful with the overall workflow and decision-making process, so I would say that was one of the most integral parts of getting the project started. It also helped during staff changes with keeping up the pace that was necessary.

A: *Bill Hanscom*: In the case of the Chinese Rare Book Project, a small sample was surveyed in order to try to estimate the amount of conservation treatment time that would be needed. Due to the sheer size of the collection, it wasn't possible to do a full assessment.

A: *Amy Lubick*: At the National Archives, it was the same thing. We do a preliminary assessment, and given the size of the collections we're usually scanning, we do a sampling as well. We'll take some controlled photos and stats and create a spreadsheet with the pertinent information to try to come up with an estimate of how much time we think the project will take. To answer the second question, we normally do not babysit our camera operators. We do spend enough time working with them and training with them, and we will pop in when we can to check in on them and see what they need, or if there are any problems.

Bill Hanscom: In answer to whether any babysitting is involved, the camera operators are pretty well trained, and in the case of this project, the camera operators have all worked on previous digitization projects on Chinese materials.

Q: *Janice Stagnitto Ellis, Smithsonian NMAH*: I have a question about whether any of your institutions have a policy that once an item has been digitized, does that affect the access given to scholars?

A: *Stephanie Jewell*: Not that I know of.

A: *Amy Lubick*: We don't.

Q: *Lynn Kidder, Library of Congress*: I have a technical question for Bill, if you don't mind. Are fore-edge splits repaired, and if so, what kinds of adhesives are used?

A: *Bill Hanscom*: Fore edge tears are not repaired, and our camera operators are trained to deal with those, and those always are flagged to signal to the camera operator that they need particular care in handling. For other tears, methylcellulose and wheat starch paste 1:1 is used.

Q: *Theresa Smith, Weissman Preservation Center, Harvard Library*: I just wanted to understand better the structure of all of your Imaging Services with Conservation. At Harvard, Imaging Services is a subunit of the Preservation Center and is overseen by preservation librarians and Conservation is integral to beginning any digitization project because of that. I'm interested in hearing how each of your institutions relates Imaging Services to Conservation.

A: *Andrea Knowlton*: In our institution, we're a separate department, but we work really closely with the DPC and with the other departments that are developing the digitization projects. So, they generally let us know pretty early in the process if there is a new project planned so we can do some sort of formal assessment of the materials. In the case of this particular project, there's just an ongoing, rotating queue of collections to be scanned, so we don't do any sort of additional assessment. If something came to the lab that was just too much treatment for us to do at that time, the item would just get pushed back in the scanning queue.

A: *Amy Baker*: At the University of Pittsburgh, due to the nature of the project, the Preservation Department assesses and treats every map before it goes to be scanned.

A: *Stephanie Jewell*: At the Walters, every manuscript that is going to be digitized comes to the lab first. So, we do have conversations between curatorial and conservation to set treatment priorities, and then there are two dedicated imaging technicians that are on-site, in-house, that we have a great relationship with, a very open dialogue. I think that's very important to the type of work that we are doing. When a decision is made not to fully treat a manuscript, we will have a conversation with our imaging technicians to let them know where there are weaker areas, something they might to have more caution with. It is a close-knit project, and that's very important to the safety of our objects. We know our imaging technicians very well, and they know when to come to us if they're experiencing any issues.

A: *Amy Lubick*: I'll just quickly say that the National Archives is currently going through reorganization, or a "transformation" as they're calling it, so I think we're still unsure how some of the various practices will operate. We will have a new and separate digitization unit, and I imagine that Conservation will be working very closely with them.

A: *Bill Hanscom*: I think Theresa summed it up for Harvard.

Q: *Sarah Norris, Texas State Library & Archives Commission*: Our institution has had digitization efforts limited by ongoing institutional problems with digital file storage and not having a dedicated space for it, and I'm wondering if any of you faced problems finding space and assigning responsibility for digital file storage?

A: *Amy Baker*: I can say for our project, from the very beginning the University Archives did not want to be in charge for that reason, and so the University just doesn't have the [scanned] images. After the items are scanned, we are not responsible for the preservation of those images.

A: *Stephanie Jewell*: We have a data manager who helps us manage the images, and where they go after they're taken. Once the images are taken and processed, they are sent to various places for storage. Having a manager for that type of thing has been very helpful.

Q: *Priscilla Anderson, Harvard Business Library*: Did any of you have any specific project management training before undertaking these large-scale digitization projects? And if so, in what way, and would you do anything differently?

A: *Amy Baker*: I didn't do any formal training, but at the University of Texas Libraries, I supervised student on projects involving image capture, and that proved helpful.

A: *Amy Lubick*: I had no formal project management training, but at the Archives we do have courses for the staff in team leadership skills and that sort of thing.

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