THE RECOVERY OF EYEBEAM ART+TECHNOLOGY CENTER'S MULTIMEDIA COLLECTION FOLLOWING SUPERSTORM SANDY, A CASE STUDY

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Acknowledgements

1.   Introduction

This case study describes the recovery of 1,300 flooded media items at Eyebeam Art+Technology Center in New York City following Superstorm Sandy in October 2012. It is intended to help organizations learn from the disaster recovery experience of one organization, with the hope that by internalizing some of the lessons that Eyebeam learned, readers may become better prepared when faced with a future disaster. An additional goal is that it will serve as a reminder to stewards of cultural heritage materials that disaster preparedness is an ongoing task; there is no starting and stopping point. Disaster plans need to be created, tested, revised, tested, and revised again. Unfortunately, with pressing day-to-day duties, disaster planning becomes an out-of-sight, out-of-mind task, and often descends to the bottom of the to-do list. This is simply unacceptable. Disaster preparedness is a fundamental component of basic collection management. By avoiding it, or only focusing on it temporarily when a disaster strikes close to home, we are simply not doing our jobs.

For audiovisual materials, short-term disasters like floods and fires serve as a reminder of the long-term disaster that is taking place before our eyes, namely, the obsolescence of playback equipment. The content on physical containers urgently needs to be migrated to the digital file-based domain. An added benefit is that once these materials become digital, simply by following IT practices, backing up and creating geographical separation of copies, content will be protected from disasters.

Retroactively pouring money and resources into a disaster recovery effort is the expensive option, and almost certainly guarantees a degree of loss. Why not put our resources into preparing for the eventual disaster? When the time comes, we can breathe a sigh of relief and get to work retrieving content from those disaster recovery data centers.

2.   The disaster

2.1. 0 hours

On 29 October 2012, "Superstorm" Sandy took aim at the New York City region. Despite urgent warnings from local and national government, including mandatory evacuations and the closing of the subway system, personal and institutional disaster plans were sporadically put into effect, and many people even chose to ride out the storm in their coastal homes.

Sandy made landfall on the southern New Jersey shore at the exact hour of high tide. The storm surge topped New York City's barriers, inundating numerous neighborhoods, including the gallery district of West Chelsea in Manhattan.

Figure 1: West Chelsea, Manhattan, from Google Maps.

2.2. 12 hours

Eyebeam Art+Technology Center is a non-profit dedicated to "exposing broad and diverse audiences to new technologies and media arts."[36] Eyebeam hosts residencies and fellowships for artists and technologists to create and exhibit their work, collaborate, and learn from master classes and from each other.

Eyebeam is situated between 10th and 11th Avenues on West 21st Street, about one block from the Hudson River. They knew they were in a flood-prone area, so when Sandy was preparing for landfall, staff, residents, and fellows made some minimal preparations by covering equipment with plastic sheeting and moving computers off the floor. Unfortunately, these efforts were not enough. Three feet of a toxic mixture of saltwater, sewage, and other contaminants submerged everything on the ground floor of the building. Over $250,000 worth of equipment—computers, lighting, and servers—was destroyed.

Amongst the damage was the majority of Eyebeam's media archive: fifteen years of videotape and computer disks containing artworks, documentation of events, and even server backups—essentially Eyebeam's entire legacy. Altogether, about 1,300 items were flooded and in urgent need of decontamination for eventual recovery.

3. First Response

3.1. 72 hours

On Thursday November 1, three days after the flood, Marko Tandefelt, Eyebeam's Director of Technology and Research, sent out an urgent plea for assistance via Twitter:

Figure 2: Tweet from Marko Tandefelt, Eyebeam's Director of Technology and Research, November 1, 2012.

With lower Manhattan still without power and public transit, Erik Piil, Digital Archivist at Anthology Film Archives, traveled by bicycle to Manhattan's west side on Thursday afternoon

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36   Eyebeam, accessed August 2013, http://www.eyebeam.org/about.

to assess the situation. The need for immediate action was urgent, as building restoration crews were preparing to demolish dry wall and power wash the floors. Erik notified AudioVisual Preservation Solutions, and Chris Lacinak, Josh Ranger, and I arranged to meet him at Eyebeam the following morning.

3.2. 96 hours

Figure 3: State of the collection on Friday morning.

When we arrived Friday morning, having traveled several miles by bicycle with gloves, masks, and a few other supplies in hand, the demolition crews were already at work. Eyebeam was still without running water or power and the only lights, powered by generators, were for construction crews. Plaster chunks and other particulate were raining down on exposed tapes and disks. A large room on the 2nd floor was identified as a safe, (albeit not well-ventilated) holding space that could be used for storage. Tables, desks, shelves, and metal shelving units were cleared, cleaned, and covered with plastic to make way for the wet media objects. With the help of a few additional volunteers who had arrived, within an hour, all 1,300 media items had been moved.

4.   Planning cleaning and stabilization

In order to stabilize the still wet media objects quickly and effectively, a large-scale recovery operation needed to be initiated. More help was required, and calls for volunteers were put out on social media, along with e-mails to the NYU Moving Image Archiving and Preservation (MIAP) and Eyebeam alumni lists. Volunteers began to trickle in. With Eyebeam staff busy handling other pressing tasks, the volunteer archival recovery team, lead by AVPreserve and Erik Piil, set to work designing a scalable and adaptable workflow that could accommodate any number of available volunteers.

4.1. Supplies

Without traffic lights, public transit, or open shops, Manhattan below 34th Street was an eerie post-apocalyptic ghost town. Obtaining necessary supplies required a time-consuming journey to the nearest hardware store, several miles away. Marko was willing to make the trip and had the authority and means to purchase the necessary supplies—a critical component to initiating recovery. We quickly assembled an order, which included gloves, masks, paper towels, micro-fiber towels, isopropyl alcohol, distilled water, lidded plastic bins, jewel cases, Q-tips, notepads, flip-chart paper, garbage bags, buckets, Sharpies, pens, paper tape, gaffer tape and more.

Marko returned several hours later with everything except the most crucial element: distilled water. We had only 4 gallons, certainly not enough for the whole effort. It quickly set in that finding distilled water where there is a water shortage is very challenging; people need water for drinking and cleaning themselves!

We managed to get by with the water we had, and asked volunteers to bring a gallon on their way if possible. Fortunately, the next day, Chris Lacinak drove twenty-four gallons in from Brooklyn, which lasted through the cleanup operation.

4.2. Designing the cleaning process

Media items were still wet with floodwater and needed to be cleaned as quickly as possible. Corrosion from salt was already visible on metallic parts. The diversity of media types meant different processes had to be developed for groups of media with shared physical characteristics (e.g., optical discs, analog video, DV formats, and data tape). Given the number of items and resources available, there was no way to do detailed work on each item in the initial effort. The goal was to prevent further damage from contamination by removing the water from the media and associated containers, and air-drying them. The processes needed to be designed to maximize the impact of treatment per item while administered by volunteers with mixed levels of knowledge of conservation and media handling.

Figure 4: Salty Mini DV tape prior to cleaning.

The processes were documented on large flip-chart paper and taped to the wall for easy reference. Throughout the operation, we conducted tests, modified methodologies, and updated these posters based on their results. For example, initially, most tape formats were to be submerged in distilled water in order to remove the saltwater. However, after tests revealed that submersion was promoting the removal of oxide from the exposed areas of MiniDV tapes, the process was modified, documented, and communicated to volunteers.

4.3. Space

Eyebeam made a number of the second floor office spaces available for the recovery operation. The five rooms in use each had a specific function.

4.3.1 Cleaning rooms: Three cleaning rooms were equipped with a clean water container for washing and a dry container for expelling water and dirt. Clean water containers were frequently emptied and refilled with fresh distilled water. Flooded items were delivered in "dirty" bins and removed in "clean" bins (each labeled as such). The three cleaning rooms were divided into the following areas:

- Central space: The largest cleaning area, used for all formats except MiniDV.
- MiniDV room: A space devoted to the detail-oriented work of cleaning MiniDV tapes.
- Optical disc room: When there were enough volunteers, an additional space was devoted specifically to optical discs, greatly increasing productivity.

4.3.2 Supplies room: One office was allocated to supplies, making it easer to locate them, to monitor inventory, and to prevent loss.
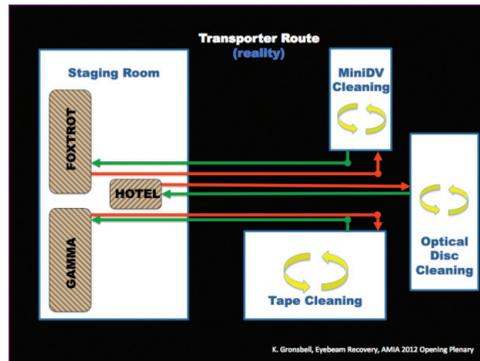
Figure 5: Cleaning workflow. Illustration by Kathryn Gronsbell, created for the AMIA 2012 conference.

4.3.3 Media storage room (waiting/drying room): The largest room served as the media storage room for items waiting to be cleaned as well as those returning from rewashing. To prevent expansion and contractions damaging to magnetic tape, as well as to avoid mold growth in the damp environment, the thermostat was set to 58°F to avoid fluctuation of heat and humidity, even after the power and heat came back on in the building. We also kept a dehumidifier/air purifier running in this room to remove excess moisture and to help remove particulate.

4.4. Workflow

Cleaning proceeded table by table in the media storage room. Tables typically contained a mix of media types, with no intellectual or technical groupings. Items from a table were loaded into a "dirty" bin, and taken to the cleaning rooms. Volunteers cleaned according to the media type. Once the "clean" bin was full, the media was taken back to the media storage room to be set out to dry.

Meanwhile, the table was cleaned and prepared for the media's return. Tables and shelves were given names based on the NATO Phonetic Alphabet. After all the dirty items were removed from a table, the plastic sheeting was removed, the table was cleaned, and brown craft paper was laid down. The paper was labeled with the table name and the time that drying began, such as, "Charlie Nov. 4 1:30PM". The media was given at least 48 hours for air-drying.

Table names also provided identifiers for media items, associated cases, and label inserts. The naming convention started with the first letter of the table name, followed by a number, e.g. C14. Numbers were incremented sequentially, and needed to be carefully documented to avoid duplication. Items with multiple pieces had their identifier applied to each component, so after drying they could be easily put back together. For example, if a CD was labeled A2, you could be certain the case was on the Alpha table. Rigid adherence to this identifier system was one of the most important aspects of the effort. As tapes, cases and paper inserts were necessarily separated from one another for drying, identifiers were needed to bind them back together, otherwise no one could know what was on that tape and whether it should be prioritized for preservation.

5.   Roles and teams

Cleaning and drying of 1,300 media objects of various formats and their associated containers, can quickly and easily become chaos. At Eyebeam, volunteers came and went as their availability allowed, and there was little consistency from day to day, or even between morning and afternoon of the same day. The transport, cleaning, and drying process had to be efficient and consistent; designated roles and associated responsibilities were of utmost importance for success.

The following roles, which are essential in any recovery operation of this type, were put in place:

Overall coordinator: Responsible for oversight of the entire operation and could unlock/lock the door, make decisions about prioritization or liaise with content experts, and could authorize use of space. This role was fulfilled by Eyebeam resident Jonathan Minard.

Figure 6: Happy volunteers after the last item had been cleaned and laid out to dry. Taken on Sunday evening, November 4, 2012, by Jonathan Minard.

Operations coordinator: This role was responsible for placing volunteers into the right positions training supervisors so that they could delegate to and train others. This was the "go-to" role for any questions about the recovery process, as well as any media-specific issues. Kara Van Malssen (author of this document) largely fulfilled this role, with the support of Chris Lacinak.

Transport crew: This group was in charge of cleaning and prepping tables, transport of dirty and clean media, and setting media out to dry. A team supervisor was instrumental in managing naming conventions and keeping track of what media has been moved, and to where. We tried to have three people in this group when operating at full capacity.

Documentation crew: This group was responsible for labeling media and related labels and cases that had been separated for drying. One documentation person per cleaning station was required at all times.

Cleaning crew: The largest group, these people were responsible for cleaning the media and their cases according to specific instructions for each media type. These volunteers had to be patient and able to perform detail-oriented but monotonous tasks.

Content experts: These were current and former staff that could identify priority materials. Fortunately, a few former staff and residents were able to stop by on the second and third days of cleaning to help with prioritization and identification of duplicate and commercial items.

Media conservation experts: Conservators designed the cleaning procedures for each media type, tested results, modified the process as needed, and provided oversight to cleaning of various media types. In this scenario, Erik Piil and Chris Lacinak provided critical guidance in this area.

Quality assurance and control: Although this was a function fulfilled by other roles described above, it is important enough to point out as a distinct role and need. This served as a mitigating factor in managing the constantly revolving door of volunteers.

An important factor contributing to the success of the effort was the lack of ego amongst the recovery crew. Recovery of flooded archival material is not a luxurious operation. Tasks were rather tedious and repetitive; the conditions dirty. There was no working bathroom and

no power the first day. The constant revolving of people required volunteers to be extremely flexible and patient.

6.   Managing risks

Figure 7: Volunteers cleaning and labeling cassettes.

Considering our context, a volunteer workforce with limited knowledge of the organization and often no expertise in the process, it is remarkable that there was minimal negative impact. We were mindful of a number of continuous risks, and worked to mitigate those:

Dissociation between media and label info: As mentioned previously, one of the great risks to the intellectual value of an item arose when a tape and its container or label were separated from one another. This often happened in a matter of seconds, as items were separated and moved down the cleaning assembly line. The employment of a documentation person to keep a hawk-like eye over the cleaning process was essential in order to avoid constant dissociation.

Lack of knowledge transfer: There was a good chance that an entirely new workforce would appear each day. Critical knowledge would leave with outgoing volunteers and often not be transferred to incoming volunteers. If only a few volunteers returned, training and overseeing an entirely new group of people took up a lot of time, posed a fresh set of risks, and reduced productivity.

Lack of supervision: When there is no supervision, supplies get lost, tapes are cleaned incorrectly, labels and media items are dissociated, and identifiers repeated. We quickly found that each area—transport, cleaning, and documentation—needed a supervisor who understood the process well, was organized, and could train and delegate to others. Volunteers who fulfilled the supervisory roles on numerous days were instrumental to the effort's overall success.

Not enough people: Fewer volunteers greatly reduces productivity and efficiency, as one person must perform multiple tasks. Most mistakes were made when there were fewer volunteers, especially in the absence of dedicated documentation crew.

Loss of morale: With so much work to do and in less than optimal conditions, it is important to make sure that people take breaks, eat and drink. Free pizza provided by Eyebeam on our second and third day of work helped tremendously.

Passage of time: By day 3, media left out to dry—exposed tape media, optical disks without cases—were getting dusty. For the few VHS tapes that did not have cotton buds placed between the tape and parts of the housing, contaminant deposits began to form around the tape edges (see photo), which needed to be brushed off.

Safety and security: Having a safe and secure room is crucial. Inevitably, a lot of activity occurs after a disaster, and many people come and go. Some level of security is essential to ensure things do not go missing, accidentally or intentionally.
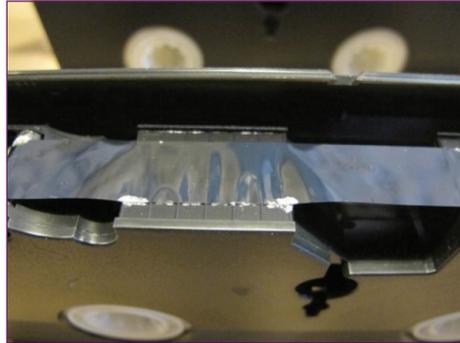

Figure 8: Contamination forming on a dried tape. Most VHS tapes had Q-tips placed between the tape and the plastic surface to prevent the tape from sticking and adhering to it while drying. By accident, a Q-tip was not placed under this tape. As a result the tape stuck, and deposits formed around the edges.

Lack of supplies: Gloves and masks, essential items for working with this kind of contamination, were constantly running out. Distilled water became a precious commodity. Supplies had to be carefully monitored so that, when needed, someone could make the long trek to the store to purchase more.

Avoiding mold growth: Maintaining a cool, dry temperature and ventilation is of utmost importance. The lack of ventilation combined with the restoration of the building's heating system and wet tapes could have easily created a fertile breeding ground for mold, causing damage to tapes and health and safety hazards for volunteers. To mitigate this risk, we kept the storage room at approximately 58°F and continuously ran a dehumidifier.

7.   Preparedness takeaways

When working to recover valuable collections from a disaster, the trained archivist cannot help but think of the essential principles of the profession, and how these could be applied in the future to help better prepare collections. Collection management principles inherently consider disaster preparedness, and by applying some fundamental measures collections will stand a better chance of withstanding the next threat. Here are just a few of the things that stood out to us during the recovery at Eyebeam.
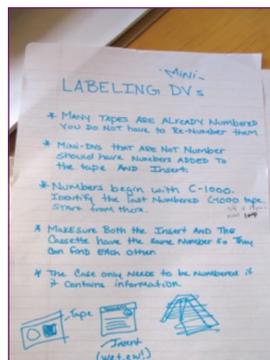

Figure 9: Instructions for labeling mini DV tapes during recovery.

7.1. Storage

When storing physical media, such as video and audiotape, following a few basic storage principles goes a long way. Media should not be stored in basements, directly under a roof, or near windows or positioned directly below leak-prone areas, such as a bathroom or kitchen. Temperature and humidity should be cool and dry, or at minimum, controlled so there is a lack of fluctuation.

Most importantly, understand the building and geographic surroundings. If you are near a body of water, as Eyebeam is, do not store valuable collections on the ground floor and especially not in basements. If you are in a hurricane or typhoon-prone area, ensure that your roof is sound.

7.2. Intellectual control

Intellectual control of an archive is a goal that collecting institutions strive for but often struggle with. It is not uncommon for an organization to have an unclear picture of its holdings. Maintaining an item-level inventory of a collection is helpful for a variety of day-to-day operations, but it becomes a critical identification and prioritization tool in a disaster scenario, in addition to being important for insurance purposes. Not having intellectual control places at risk the ability to effectively allocate limited resources towards salvaging the most important parts of the collection. Lacking this, you may be working with something of no value at the expense of your most important item.

Eyebeam did not have an inventory of its archival holdings leading up to Sandy. An accessible inventory (since there was a lack of power and internet during the first few days, a printed, laminated inventory would have been necessary) with indication of priority items would have been priceless. Knowing which items were most valuable to Eyebeam would have allowed us to prioritize those requiring immediate attention.

7.3. Deaccessioning

Disasters drive home the fact that deaccessioning is a good thing. As mentioned above, with no inventory or institutional knowledge, our volunteer recovery team was unable to make prioritization decisions. So when confronted with ten copies of what appeared to be a commercial DVD, we had no choice but to treat each one as if it were unique. Volunteers could not judge whether these were simply replaceable, commercial items, or if they were perhaps art objects. Most likely, they were simply overstock that could have been thrown away.

Again, cleaning and treating items that simply do not need to be is a waste of resources, and jeopardizes those items more urgently in need of care. When a flood topples shelves and mixes everything together, and there are no identifiers or inventory to indicate which are priority, one has no way of knowing when something should be thrown away. Getting rid of items can be a challenge, but spending time cleaning things that do not need to be is even a bigger one.

7.4. Labeling

For media such as video, audio, and data tape, which are machine dependent and have multiple parts, having labels with identifiers on all components is critical, especially when items are separated from their container labels. Dissociation of media and their labels could be inadvertent, such as when the water tossed the media off their shelves, or intentional, such as when things have been laid out to dry after cleaning. Though we established an identifier system during recovery at Eyebeam, items that were previously labeled with identifiers on the tape, case, and insert were valuable, saving time and greatly simplifying the recombination of separate parts.

7.5. Communications

Disaster planning guides nearly always call for the creation of a "telephone tree." This concept needs to be updated for contemporary communications mechanisms, for a few reasons as you never know which communication system may be down in an emergency. It is important to have all phone numbers (including mobile for text messaging), email addresses (all associated with a person, considering your company mail server could be down, but Gmail is still functioning), Facebook, Twitter and other social media accounts for all critical staff and support personnel. Furthermore, these need to be reviewed and updated periodically, as common communications mechanisms evolve. During Sandy, we found that text messaging and Twitter worked well, while telephone and many mail servers were out of commission.

8. Outcomes, next steps, and the need for digital preservation

After three days, more than 1,300 media items had been cleaned and stabilized. In the following two weeks, those items, plus another 600 that were not damaged, were inventoried by more dedicated volunteers, producing the first comprehensive inventory of the media collection at Eyebeam. The inventory was created in a Google Spreadsheet to enable simultaneous cataloging. Data entry guidelines and controlled vocabularies were established to ensure useful and uniform entries.

The inventory is a critical tool moving forward, serving two primary purposes: to help prioritize for the migration of flooded media items' content to stable, file-based storage, and to serve as the foundation for establishing a managed archive.

In situations like this, prioritization plays an enormous role in the overall long-term recovery effort. While much of the content can likely be saved and transferred, it will ultimately require costly specialized restoration. It is essential that the most important items be treated first. Therefore scarce resources can be properly allocated so that only unique items will be prioritized for restoration and migration. In many cases, the artists themselves hold a copy of the work, meaning it may be easier to obtain a copy from them, rather than seek expert recovery services.

The inventory also can be used to help estimate costs and storage requirements. These estimates are valuable for fundraising through grant applications. Funds are currently being raised to support the restoration of the damaged material and to establish the new archive.

8.1. Establishing the archive

The vulnerability and instability of a single copy of a piece of media becomes readily apparent in a disaster. Unlike paintings, sculptures and textiles, the content contained on the media is not inextricably bound to its physical state; it is the content not the carrier that holds value. The good news is content can be migrated to the file-based domain, and in that world, disaster preparedness becomes more attainable. Files can and must be replicated, backed up, and stored in geographically separate locations. If one copy is damaged or destroyed, another can replace it.

Long-term preservation of audiovisual, multimedia, and digital content requires more than just good storage, however. To truly be preserved, the content must remain accessible. This means that content needs to be findable in a digital environment, understandable to those who might use it, accessible in a common format, and readable using contemporary technologies. An archive is not simply the collection and storage of data; it is a system of people, policies, and technologies managing content over time to ensure it remains accessible through ever-changing landscapes.

New funding will support the development of a digital archive initiative at Eyebeam. The archive will be founded upon new institutional policies and practices for the collection of artists' works and their documentation; technologies to provide the backbone of a stable digital infra-

structure; and methods of providing access to artists, researchers, and the public in new and innovative ways. These approaches, along with partnerships with other institutions, will help enable the establishment of a sustainable digital archive. This is the silver lining in this story. As Executive Director, Pat Jones states in Jonathan Minard's documentary, *Recovering Eyebeam's Archive*, "We are coming back, as our neighbors are, and hopefully we'll be stronger and we'll be learning from this experience, and we'll also be putting more emphasis on the importance of our archives and looking to see if we can make better use of them and make them available to a wider public than they have been in the past."[37]

By so generously and openly sharing its story, Eyebeam is provoking conversation about the critical need for long-term digital preservation planning, which hopefully will inspire small arts and heritage organizations and others currently holding ad hoc collections to take the necessary steps to ensure that the content in their care has enduring value. In an age of rapidly advancing technologies and increasingly frequent disasters, there is no time to waste.

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37   Jonathan Minard, "Recovering Eyebeam's Archive," Deepspeed Media, November 2012, accessed August 2013, http://www.deepspeedmedia.com/recovering-eyebeams-archive/.