

Recommendations & Comments

John Nemmers Sabbatical Research



The recommendations and other content below were produced initially by sabbatical research completed by John Nemmers in Fall 2012. The **sabbatical report available at <http://ufdc.ufl.edu/IR00003159/00001>** includes general conclusions/recommendations, but specific recommendations are available in this document. In addition, these recommendations are [available on a wiki](#) for discussion and collaborative editing by UF staff.

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- [Survey UF Records](#) to identify and plan for transfer to Archives

Many of these recommendations involve the creation of new or revision of existing [Policies, Guidelines and Forms](#).

Recommendation: Create a Task Group

Create a task group to discuss/ implement the recommendations in this report and to develop new recommendations. This group can be charged with creating various [Policies, Guidelines and Forms](#) needed in a digital archives program. Initially, this group can consist of members of the Archivists & Manuscripts unit (e.g., John Nemmers, Peggy McBride, Dennis Kozak, and Cathy Martyniak), but to be successful it also should include personnel from IT, the Digital Library Center, and possibly Libraries administration. This group also should initiate discussions with UF offices and units. Optimally, members of this group such as Peggy McBride and Dennis Kozak should participate on UF-wide committees/groups and serve as liaisons between the Libraries and the rest of UF.

The task group should assess current and needed resources, such as:

- Personnel. Who will contribute to the digital archives program (include archives, IT, etc.)? How much FTE will the program require? Will personnel need training/development?
- Software, hardware, storage media/space, online services, etc. How much will it cost to purchase/implement/maintain hardware/tools/services?
- Administrative support (Libraries, UF). What are the costs associated with advocacy and promoting the program?
- Funds. What existing funds are available? What internal/external grants are available?

At a minimum, the members of this task group should read/view the following resources:

- Goldman, Ben. "Bridging the Gap: Taking Practical Steps Toward Managing Born-Digital Collections in Manuscript Repositories." *RBM: A Journal of Rare Books, Manuscripts, and Cultural Heritage* 12:1 (March 2011). <http://rbm.acrl.org/content/12/1/11.full.pdf+html> or <https://scholarsphere.psu.edu/downloads/c534fn93r>
- Erway, Ricky. "You've Got to Walk Before You Can Run: First Steps for Managing Born-Digital Content Received on Physical Media. An OCLC Research Report." <http://www.oclc.org/content/dam/research/publications/library/2012/2012-06.pdf>
- New York State Historical Records Advisory Board's tutorial, "Preserving Electronic Records in Colleges and Universities." <http://www.nyshrab.org/training/erecords/>

Recommendation: Seek Education, Training and Networking Opportunities

All archivists should seek education/training/networking opportunities relating to digital archives and digital preservation. There are numerous reports, articles, webinars/tutorials, project sites, etc., that point to the need for education and training regarding born digital archival materials.

Two recent surveys highlight the importance of education/training:

- Dooley, Jackie M., and Katherine Luce. 2010. *Taking Our Pulse: The OCLC Research Survey of Special Collections and Archives*. Dublin, Ohio: OCLC Research. <http://www.oclc.org/research/publications/library/2010/2010-11.pdf>. Survey respondents identified management of born-digital materials as the top area in which education and training are needed.
- Nelson, Naomi, et. al. *Managing Born-Digital Special Collections and Archival Materials*. SPEC Kit #329. Association of Research Libraries, 2012. This survey produced similar responses that born digital training is a priority among ARL institutions.

Ideally, non-archivist personnel from IT, the DLC, etc., also will receive the same education/training so that everyone shares the same information. The Society of American Archivists offers a Digital Archives Specialist (<http://www2.archivists.org/prof-education/das>) curriculum and certificate program, which includes several workshops that would be valuable as we develop our digital archives program. It is advisable that at least one archivist should complete SAA certification. We must seek administrative funding to attend workshops and

meetings. Of course, there are several less expensive alternatives including the New York State Historical Records Advisory Board's excellent tutorial, Preserving Electronic Records in Colleges and Universities (<http://www.nyshrab.org/training/erecords/>), and the Digital Preservation Management tutorial hosted by M.I.T. (<http://www.dpworkshop.org/>).

Recommendation: Revise the deed of gift and transfer agreement forms so that they cover born digital materials.

Alternatively, we could create a separate digital materials agreement/submission form that can be appended to the deed of gift or transfer agreement.

- The agreement document should cover: restrictions, copyright, sensitive information, disposal of unwanted data (e.g., duplicates or files infected with viruses), and methods for providing access to researchers (e.g., in the Reading Room only, online, or limited to specific people or IP addresses or via the VPN).
- The archivist and the donor/UF unit should agree whether the data will be captured using disk images or file transfer. This should be stipulated in the donor agreement or records transfer agreement. A disk image is a bit-stream copy of the storage medium. The donor/UF unit should be aware that disk images also preserve deleted files that are recoverable. File transfers or logical disk images involve the copying of selected files/directories, so deleted files are not copied and unwanted files can be skipped. See the recommendation re: [Creating Disk Images or Transferring Files](#).

Tufts has developed submission agreement models: <http://sites.tufts.edu/dca/about-us/research-initiatives/taper-tufts-accessioning-program-for-electronic-records/deliverables/>

Chris Prom has developed a template: <http://e-records.chrisprom.com/recommendations/develop-submissioningest-policies/submission-agreement-form/>

Recommendation: Whenever possible, ask donors and UF units to submit metadata along with their digital materials.

Preferably, this metadata should be submitted in Excel, a database or a delimited file format. We can develop a standard metadata form for their use. If they are unable/unwilling to submit metadata we should ask them to provide as much information as they can. In particular, we should ask them to:

- Explain their file naming and file management practices (ideally, we would play a role in establishing those practices in the first place)
- Identify and flag directories/files that contain or are likely to contain sensitive information
- Provide contextual information for important files or groups of files (e.g., were there shared creators, why were the files created, etc.)
- Identify which files also exist in paper version (i.e., they were printed)

We need to gather information from creators/donors about the types of digital materials they have and the types of software/hardware used to create the digital materials. This information will help dictate how the materials will be accessioned, arranged and described.

Recommendation: Create physical media storage boxes.

All digital media will be stored together in a single location rather than being stored with their analog parent collections. In other words, all digital media (disks, CDs, etc.) from all collections will be stored together in one set of media storage boxes. Media will be removed from analog collections using separation sheets. Original locations will be documented using the [Digital Media Tracking Spreadsheet](#).

Topic for future discussion: Do physical media need to be retained indefinitely? Certainly, it makes sense to retain the media during processing and for a period of time after processing to ensure successful preservation, but can we consider discarding the physical media once the content and contextual information has been preserved?

Recommendation: Create guidelines to help archivists decide whether to create disk images or simply transfer the files.

- In most cases creating a disk image is the preferred method for accessioning data. A disk image is a bit-stream or bit-by-bit copy of everything on the storage medium. One drawback to creating disk images is that they include everything on the original medium, including deleted and possibly unwanted data, and any unused space. If there are viruses on the storage media, then those viruses would be included in the disk image as well. The viruses are basically harmless while captured in a disk image, but it is possible that they could be activated if accidentally extracted from the image at a later date.
- With file transfers archivists use a tool like Windows Explorer to simply copy the directories and files from the original medium to a quarantine computer. One drawback to simple copying is that it may result in the loss of metadata associated with the files. One advantage is that the archivist can select only those directories/files that will be retained, and the process will not capture unwanted files or deleted files.
- It is advisable to complete virus scans and remove all viruses before accessioning the data either via disk imaging or file transfers. The virus removal process may result in the deletion of infected files, so be aware that information may be lost along with the viruses.
- There are occasions where we may have to create a disk image and preserve the content exactly as it is, even if there are viruses, sensitive info, duplicate files, empty space, and deleted/unwanted data. In other words, we would preserve everything- the good and the bad. For example, certain types of media such as read-only CDs require the creation of disk images because virus removal is not possible. One option would be to create a disk image “as is” and then complete virus scans and deal with sensitive info and unwanted files at a later date. Then, a second “clean” derivative version of the image can be preserved and used to make access derivatives.
- Creating disk images is slightly different for each type of storage medium.

Recommendation: When appraising possible donations or transfers, conduct a survey of any digital materials included.

Ideally, this should be done prior to accepting/transferring any digital materials, but the survey can be conducted upon receipt of digital materials. The survey should be completed with input from the donor or UF unit so that we can gather information about content/context and identify potential issues (e.g., obsolete technology, sensitive information, unwanted content, etc.). A survey conducted before accepting any transfers or donations of digital materials allows us to determine if we have the resources necessary to properly store and manage the data. We should create a standard survey form. There are numerous survey forms available for use as models, but a few are included below:

AIMS Digital Material Survey http://www2.lib.virginia.edu/aims/whitepaper/AIMS_final_appF.pdf

Recommendation: Create a digital media tracking spreadsheet.

This spreadsheet will include fields such as accession number, container number, medium ID/barcode number, medium type, manufacturer, maximum medium storage size, folder title if applicable, label information (dates, file formats, etc.), PC/MAC/unknown, etc.

The spreadsheet will also include workflow fields such as virus scan completed, virus actions taken, imaging completed, imaging notes, sensitive info notes, current storage location (i.e., quarantine workstation, archival storage, digital repository storage).

There are models available including:

- <https://sites.google.com/site/workflowdocumentation/2-accessioning/2-1-establish-physical-control>

Recommendation: Document all decisions and actions.

This one is simple and doesn't require much discussion. All experts agree that it is critical that every decision/action be documented. We can use AT to for some of this documentation, but we can also simply create readme text files explaining our decisions/actions and save these files along with the digital objects/metadata.

Recommendation: Use Archivists Toolkit or ArchivesSpace to record accession information about digital holdings.

- Update the accession record for the analog collection to include the total number of physical media (e.g. hard drives, floppy disks, CDs, laptops etc.).
- Create a separate accession record for all born digital files acquired in an accession. The new accession record should link to the [Digital Media Tracking Spreadsheet](#) and the resource record for the Smith Collection in AT.

Example: if the legacy Smith Collection includes 3 CDs then we would first update the Smith Collection accession record indicating the presence of the 3 CDs. Next, we would create a new accession record for those CDs that would include the number of files and total size.

Example: if a newly acquired Jones Collection consists entirely of digital content (i.e., there are no analog materials), there would only be one accession record in AT.

Recommendation: Assign barcodes with unique identification numbers to all physical media.

These barcode numbers will be used to track and manage the digital data. The application of pre-printed barcode labels and the use of barcode scanners will save considerable time during processing. Whenever possible the barcodes will be applied directly to media. All media such as CD/DVDs that are not in cases should be housed in archival sleeves and the barcode should be placed on the sleeve.

Recommendation: Create a consistent approach to file management for all digital materials ingested into the archives system.

Following the OAIS model, there are two types of packages we're concerned with: the Submission Information Package (SIP) and the Archival Information Package (AIP). The SIP is transferred from the creators/donors and assembled/generated during accessioning. This package includes the digital object plus all associated metadata.

The AIP is the version that is stored and preserved. It includes everything in the SIP, plus derivatives/copies created during processing as well as any metadata that may have been enriched during processing.

A typical SIP might include the following folders/subfolders:

- top folder = Accession number/Barcode number
 - subfolder 1 = original files- write protected
 - subfolder 2 = copies/derivatives to be used during processing
 - subfolder 3 = file inventory including technical/descriptive metadata
 - subfolder 4 = photos of media if captured from media

After processing, the AIP would include all of the above plus post-processing objects and any new/enriched metadata.

Recommendation: Photograph all storage media.

- Insert print-outs of the photos with separation sheets in the original locations in analog collections.
- Images of media can also be saved in the project directories on networked storage.

Recommendation: For certain types of physical media (e.g., floppy disks) use write-protect tabs to preserve the digital content and prevent accidental writing to the media. Also, we should acquire and use write-blocker hardware.

Some types of floppy disks include write protection tabs that can be used to ensure that no new data is written on the media.

In addition, our [Quarantine Workstation](#) should include a write-blocker as part of its hardware configuration (e.g., Tableau Forensic USB Bridge). The write-blocker turns a read-write drive into a read-only drive so that no digital content can be changed/added/deleted.

Recommendation: Request that the IT department set up a dedicated workstation for digital archives accessioning/processing.

This workstation will be quarantined (i.e., it will not be networked) to prevent the spread of viruses, but the workstation has to be up to date with antivirus software.

- This workstation should include a write-blocker as part of its hardware configuration. The write-blocker turns a read-write drive into a read-only drive so that no digital content can be changed/added/deleted.
- This workstation should include an external drive for regular backups (particularly useful when accessioning numerous files over several days).

Recommendation: Request that the IT department set up a dedicated space on our servers for trustworthy storage of digital archives holdings.

We must implement some storage solution even if it is simply using media storage and later getting server storage. We need two separate storage solutions: one for archival masters (server or external hard drives) and one for access (UFDC). Note that if we use physical media storage rather than servers, we have to have backup drives.

- Confirm that this storage location will only be accessible by archivists and trusted IT personnel.
- Confirm that this storage location will be backed up regularly, including off-site copies.
- We have to stress to IT and Admin when making this request that storage is a perpetual cost and not a one-time expenditure. Born digital materials must be preserved forever.

Recommendation: Create a digital archives "Toolkit" of various software applications. This toolkit should include Archivemata, FTK Imager, and WinDirStat.

- Archivemata is intended as a full service digital preservation system that handles a variety of tasks including preparing digital objects for ingest, ingesting them into storage, and providing access to the archived material. There really is no single tool that covers all aspects of the e-records lifecycle, but Archivemata comes a lot closer than other tools available currently and it should satisfy most of our needs.
- FTK Imager is used to create disk images (free). The full version of Forensic Toolkit (purchase) can be used to create forensic metadata.
- To search for sensitive information, Identity Finder is a good tool. This program also can be used to "shred" files (it's not enough to simply delete unwanted files since deleted files are often still recoverable).
- WinDirStat is an excellent tool for appraisal, selection, etc. It audits the directory structure of a drive/device and provides a visual display of all files on that drive/device.
- There are many tools and services available for website archiving, but many digital archivists recommend Archive-It because it is very customizable and easy to use. It is probably less expensive than using free software, which takes a lot of labor to setup/manage.
- Quick View Plus, Treecize Pro, and Disk Analyzer can be used to review files without modifying anything. These and other tools such as Fast Duplicate File Finder and Clone Spy are useful for identifying duplicate files.
- If transferring files manually (as opposed to creating disk images), Karen's Directory Printer can be used to document the files/directories by capturing metadata such as checksums, file names, formats, creation dates, file sizes, etc. This metadata is generated as a tab-delimited file that can be imported into a spreadsheet.
- FITS can identify thousands of file formats, extract technical metadata for many of these file formats, and even validate a small number of the file formats.
- Tools such as Aid4Mail, Thunderbird, Mailstore Home and Offline IMAP can be used to capture/view email.

Note that some of the emerging digital archives tools such as Archivemata and Curator's Workbench bundle some of the tools above (or similar tools) in their applications. For example, Archivemata bundles FITS.

Recommendation: Investigate with the IT department the acquisition/preservation of selected obsolete and near-obsolete hardware.

The hardware would include external floppy drives (5.25 and 3.5"), Zip drives, microcard readers, etc., as well as the necessary connectors/drivers that enable these to connect to the [Quarantine Workstation](#).

There is no need to attempt to collect/preserve unusual hardware (e.g., drives capable of reading 8" floppies). Simply maintaining 5.25" and 3.5" drives would address most of our needs.

We should ask IT to gather retired drives from UF surplus.

Some archivists report that their IT departments are unwilling to maintain obsolete or near-obsolete technology, so we may investigate the possibility of using hardware maintained at other repositories or through vendors.

Recommendation: Follow these basic procedures for capturing digital content from media.

Note that some of these steps will be completely manually and some will be completed automatically using Archivematica.

- Apply barcodes to media (record in media tracking spreadsheet)
- On the dedicated digital archives [Quarantine Workstation](#), create a project directory for receiving the digital content. This directory will include a subdirectory containing the actual data copied from the media, as well as any files documenting the capture process.
- Take photos of media and save photos in project directory.
- Ensure [Write protection](#) by using a write-blocker when possible and/or ensure that write protection tabs are used on physical media
- Insert/connect the physical storage medium to the dedicated digital archives processing computer (e.g., insert a floppy disk into a floppy drive, attach a USB drive to a USB port, connect an external hard drive, etc.).
- Do not open any files.
- Run virus-scan software to identify and remove harmful content.
- Copy data from the physical medium to the data subdirectory on the processing computer by creating a disk image (i.e., a bit-stream copy) of the storage medium or by simply copying the directories and files from the original medium to the data subdirectory on the processing computer. One drawback to simple copying is that it may result in the loss of metadata associated with the files. One drawback to creating disk images is that they include everything on the original medium, including deleted and possibly unwanted data, and any unused space. If simply copying, it's advisable to also document all directory information including file names, sizes and dates. For more info see the recommendation re: [Creating Disk Images or Transferring Files](#).
- Generate a checksum on the disk image or generate checksums for each file if you copied the files individually rather than creating a disk image. A checksum is a unique signature or key created using an algorithm for any unique digital file. Commonly used checksums are MD-5 and SHA-1.
- Search for and identify sensitive information to restrict or redact. The actual restricting/redaction may be completed later during processing. Be aware that text searches will not discover sensitive information present in images (e.g., scanned documents stored in TIFF format) or PDFs without recognized text.
- Identify deleted data, duplicates and other unwanted files to remove. The removal of these files may be completed later during processing. Search for duplicate files by comparing checksums and other characteristics.
- Create access derivatives and move access copies to access repository. This step is optional at this point; it may be completed later during processing.
- Document all decisions/steps by creating a text file and saving it in the project directory.
- Return the physical media to digital archives storage location. Note: we may decide to discard at some point in the future.
- Create/revise accession records in Archivists Toolkit.
- Copy the complete project directory (which contains the data subdirectory) to archival storage.

- Document access restrictions and determine additional preservation activities needed.

Recommendation: Create and implement procedures for capturing online digital content such as websites.

Coming soon...

Recommendation: Create and implement procedures for preserving email.

Coming soon...

- here's a good workflow we might adapt: <https://docs.google.com/presentation/d/12ZxXQlcz7SDViWL1xi3pz8h5xiQQtMluMYKg4gcsLk/embed?hl=en&size=s#slide=id.p13>

Recommendation: Conduct an inventory and establish physical control over extant born digital archival holdings.

This would be a good mini-grant project for the [Task Group](#) to pursue.

- Conduct an inventory of all born digital materials already part of our archival holdings. Many of these materials can be identified by searching our archival descriptive information for terms such as: electronic, CD, DVD, disk, diskette, floppy, disc, USB, drive, Zip, Flash, computer, cartridge, data, digital, etc.
- Physically count and describe all media using the [Digital Media Tracking Spreadsheet](#) (including type/manufacturer of each medium, maximum storage size of each medium, etc.). There is no need to open and view the digital files at this point.
- To determine the estimated number of bytes needed to store all extant digital holdings, multiply the number of physical items by the maximum storage size for each item. For example, if we have 300 CDs with a maximum storage capacity of 700Mb each, the total storage needed would be 210Gb.
- Make note in the media tracking spreadsheet of information such as dates and file formats if indicated on media labels. This information can be used to determine if digital content will require particular software/operating systems.
- Assign [Unique Identification Barcodes](#) to all physical media.
- Physically separate all digital media from analog holdings and transfer to [Media Storage Boxes](#). use [Write Protection](#) devices on media when possible. [Photograph Media](#) and insert print-outs of the photos with separation sheets in the original locations.
- Update existing [Accession Records](#) in Archivists Toolkit to indicate the number of digital media found in each collection.
- Either as part of this project or as a follow-up project (possibly with external funding) [Complete Accessioning and Processing Extant Digital Holdings](#).

Recommendation: Undertake a project to complete accessioning and processing of extant born digital holdings. The project also should produce an access/preservation plan.

Note that this can either be completed as part of the proposed [Extant Born Digital Holdings](#) project or as a follow-up project (possibly with external funding).

- Using Archivematica, capture descriptive/technical information such as label information, type of medium, creator, dates, and information about the software/hardware used to create/use content.
- Using Archivematica, transfer digital content from physical media to digital storage space (i.e., ingest digital content)
- Formulate plan for providing access to and ensuring preservation of digital content.

Recommendation: Conduct a survey of UF Records to identify archival digital records and plan for transfer to the University Archives.

More soon...

We should consider a pilot project involving selected UF records creators. After the program demonstrates successful capacity/services we can broaden scope university-wide.

Policies, Guidelines and Forms

The policies, guidelines and forms below are required to ensure an effective and efficient digital archives program.

Policies:

- Collection Policies (revise existing/create new)
- Born Digital Materials Policy covering preferred file formats, preservation actions, access, etc. (e.g., see <http://e-records.chrisprom.com/recommendations/develop-submissioningest-policies/electronic-records-deposit-policy/> and <http://e-records.chrisprom.com/recommendations/electronic-records-program-statement-template/>)

Guidelines/Procedural Documents:

- Accession Workflow
- Transferring Digital Materials (via Electronic Transfer or Media) (e.g., <http://e-records.chrisprom.com/recommendations/develop-submissioningest-policies/transfer-guidelines/>)
- Capturing Digital Records (see recommendation re: [Creating Disk Images or Transferring Files](#)) (e.g., these Hull idiot guides are very good: <http://www.hullhistorycentre.org.uk/discover/pdf/Idiot%27s%20Guide%203%20-%20FTK%20Imager.pdf>)
- Housing, Retention and Disposal of Storage Media
- Access to Restricted Materials
- Preservation and Access Guidelines (e.g., <http://e-records.chrisprom.com/recommendations/supported-formats/>)
- Preserving Email
- Capturing Online Content

Forms:

- Digital Media Tracking Spreadsheet (see recommendation re: [Digital Media Tracking Spreadsheet](#))
- Digital Materials Survey Form (see recommendation re: [Digital Materials Survey](#))
- Deed of Gift and UF Records Transfer/Submission Agreement (see recommendation re: [Legal Agreement Forms](#))

- Checklist (can be part of Tracking Spreadsheet): virus check, imaging/transfer of files to quarantine, create preservation metadata, etc.
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General Comments Regarding Manuscript Collections - Thoughts/Points for Discussion

- We have to specify in our collecting policy and guidelines which formats and media we are willing to accept, as well as the acceptable methods for transferring digital materials. We also have to specify the formats we are willing to provide to users. One logical option would be to only provide access to normalized derivative files (e.g., a PDF/A instead of the original Wordstar file).
 - See recommendation re: a project to inventory and establish control over [Extant Born Digital Holdings](#) (follow-up project: [Complete Accessioning and Processing Extant Digital Holdings](#))
 - see recommendation re: conducting a [Digital Materials Survey](#) before accepting/acquiring digital accessions from donors
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General Comments Regarding University Archives Records - Thoughts/Points for Further Discussion

- A major goal should be to provide guidance re: file naming and file organization practices to UF records creators. We can not be passive/reactive about e-records.
 - We have to specify in our collecting policy and guidelines which formats and media we are willing to accept, as well as the acceptable methods for transferring digital materials. We also have to specify the formats we are willing to provide to users. One logical option would be to only provide access to normalized derivative files (e.g., a PDF/A instead of the original Wordstar file).
 - see recommendation re: conducting a [Digital Materials Survey](#) before accepting/acquiring digital transfers from UF units
 - see recommendation re: a project to [Survey UF Records](#) to identify and plan for transfer to Archives
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Accessioning and Processing Workflow - This is a proposed workflow for appraising, accessioning and processing born digital materials.

This workflow can be expanded considerably, and ideally will exist as a flow chart that includes all decisions/steps. But this is a start...

Appraisal

1. Conduct survey
2. Determine resources
3. Work with creator/donor to generate descriptive metadata, identify sensitive information, etc.
4. Complete deed of gift/transfer agreement

Acquisition and Accessioning

1. Acquire the materials (by accepting media from the creator, by copying files from the creator's computer, by transferring files via FTP or online service, or by using web capture applications).
2. Establish physical control (apply barcodes, separate from papers, fill in tracking spreadsheet, capture label info, photograph media, etc.)
3. Virus check on quarantine workstation

4. Create disk image or transfer files
5. Generate checksums
6. Capture technical metadata
7. Gather descriptive metadata (ideally, creator is supplying most of this)
8. Survey file formats and assess preservation needs
9. Check for sensitive information
10. Identify arrangement/order and create a file inventory (includes checksums, date last modified, date created, folder structure)
11. Create copies/derivatives to be used during processing
12. Transfer captured data and metadata to secure networked storage
13. Update/create accession record in AT

Processing

1. Create descriptive metadata
2. Identify and flag restricted files
3. Identify sensitive information (restrict or redact)
4. Create rights metadata
5. Create access derivatives
6. Update EAD
7. Transfer access derivatives to UFDC or other access point