Electronic Records Management Guidelines
Digital Media Storage- Facilities and Procedures

Summary
State and local governments often use automated information systems to create, capture, or maintain public records. Many of these records, because they will be of long-term or enduring value, must remain accessible over time. Some will be needed to continue critical government operations, some to document programs, and some to provide legal evidence. For practical reasons, you may want to remove the records that you do not refer to frequently from an on-line system to a lower-cost off-line storage facility until their disposal date. To ensure timely access to automated information, users must be able to identify and retrieve records on-line, near-line, or off-line. If stored off-line, records of enduring value will require special maintenance due to the basic instability of the media as well as system conversions that may jeopardize their long-term safety.

Media Life Expectancy and Hardware Obsolescence
Even when properly cared for, all digital media and hardware have limited life expectancy. Media life spans are dependent on a number of factors, including manufacturing quality, age and condition before recording, handling and maintenance, frequency of access, and storage conditions. Hardware may be supplanted by rapid advances in technology. Therefore, storage of digital media demands greater planning and attention than for traditional formats such as paper or microfilm. The suggestions in this guideline provide basic information on the design and management of a digital storage facility. For more information on choosing and caring for digital media, refer to the *Digital Media* guideline.

Storing Digital Media
For records of long-term or enduring value stored on electronic media, we encourage state agencies and local governments to use the following guidelines:

Planning

Access: Decide how you will provide ready access to the records you store off-line.

Media and systems: Select appropriate media and systems for maintaining your records. The Archives will not dictate which media you use to store your records. However, the records MUST be accessible for the full-length

of their retention periods. For electronic records, this will require periodic "refreshing" (transfer to new media). Any long-term (10+ years) record will need to be migrated/converted to a new media either every ten years or sooner if access to the records is jeopardized because of either hardware or software obsolescence.

Maintenance

Access: Maintain your records in a usable format and keep up to date all materials needed to access them, including indexes and other documentation, until they are scheduled for disposal or permanent retention. In instances where you maintain non-confidential public records permanently in your agency, you will need to create a plan that provides easy access to those records upon request.

Backups: Maintain backup copies of records and all materials required to access them in an off-site, geographically different, location that does not share the same disaster threat.

Labeling: Develop procedures for labeling storage media. Each external label should carry information unique to the medium it identifies. At minimum, it should display the name of the organizational unit responsible for the data, the system title, the file title, the disposition date or permanent status of the record, and its security classification, if applicable.

Inventories: Develop procedures to maintain an accurate and up-to date inventory of records stored off-line. A useful inventory will contain the following information about each tape: tape ID; file title(s); system title; dates covered by file(s); date moved off-line; the recording density; type of internal labels; volume serial number, if applicable; number

of tracks; character code/ software dependency; information about block size; and the number of the tape if part of a multi-tape set. Where applicable, it will also give the number of records for each set of data, the format of the record, and logical record length.

Care and Handling of Digital Media
All Media
- Purchase and use high quality storage media. Batch test new media to validate manufacturing quality.
- Read a statistical sample (3% minimum) of recorded media annually to identify and correct any loss of data. Re-copy batch if errors appear.
- Prohibit smoking and eating in areas where digital media are stored and also in media test or evaluation areas.
- Maintain media in storage areas that are dust-free and controlled for temperature and humidity.
- Open a recordable media package only when ready to record.
- Store all digital media vertically in their cases.

Magnetic Media
- Wind and rewind magnetic media before recording.
- Every three to four years — or more frequently if you read them often — rewind each tape under controlled tension.
- Before they are ten years old, re-copy tapes onto new tapes.
- Minimize handling and avoid touching the media surface or edges.

Optical media
- Do not touch or mark the data side of the disk surface. Handle disks by the outer edge or center hole.
- Be careful not to damage the label side of the disk. Do not apply or attempt to reposition adhesive labels. Do not write on disk with pen, pencil, or fine tip marker. Use only non-solvent based felt tip permanent marker.
- Check disk for damage or contamination after each use. Clean only when surface contamination is visible by wiping in a direction going around the disk.
- Depending on use and storage conditions, CDs should be re-copied every five years or sooner.

Solid State Media
- Media should be handled by the case (in the case of a USB drive), or only by the extreme edges.
- The gold contact plates should never be touched.
- Labels should only be applied in approved label areas.
- Solid state media are not adequate for long-term storage; records should be transferred at least every five years.

Cloud Storage
A cloud service provider is a third-party vendor. When contracting with a cloud service provider be aware:
- Both the access point and the cloud service provider must have internet connections for the data to be accessed
- Of possible export restrictions on your data. Many cloud servers are not located in South Carolina.
- Of the disaster plans of the cloud service provider. If they experience a disaster but you do not, you may not be able to access your data.
- Of the security plans of the cloud service provider. Will your data be safe?
  - What steps will the cloud service provider take to keep your private information private?
- Of the longevity plans of the cloud service provider. What happens if they go out of business?

Storage Facilities
If you use a storage facility, you will need to:
- *Establish a policy.* Your storage facility and procedures policy should mesh with your overall records management strategy. Address both operational and legal requirements to ensure that you store and handle your records in accordance with South Carolina law, while also meeting your operational needs.
- *Evaluate the physical storage space.* Storing your electronic records in a space designed for that purpose will help you maintain your records as long as legally and operationally necessary.
- *Develop access procedures.* Procedures for access and use of the storage facility must detail who may access the facility, retrieve records, add records, and dispose of records.

General Storage Facility Requirements
The desirable qualities of a storage facility for records are:
- *Adequate floor space.* You will need to consider:
  - The current volume of media you need to store
  - The projected volume of media you will need to store in the future

- The impact of using records retention schedules to eliminate records that are no longer needed
- *Security.* Allow only approved people to access the storage facility. You will want to consider, among other things:
    - A controlled entrance (e.g., security code keypad, smart-card swipe)
    - An alarm system that sounds if an unauthorized person attempts to enter the storage facility
- *Convenient location.* Consider how often you will need to access the storage facility to help determine how conveniently located your storage facility needs to be.
- *Adjustable lighting.* Your storage facility will need to have adequate lighting available for people using the facility.
- *Ventilation.* Good ventilation will help prevent dampness, mold, and pest infiltration.
- *Temperature and humidity control.* Proper temperature and humidity are essential for preserving electronic records on digital media. Temperatures and humidity levels that are above or below the recommended range can deteriorate electronic and paper records. Above all, you should strive for a consistent environment, without sudden or drastic changes in temperature or relative humidity. A good temperature and humidity requirement for storage facilities is as follows:
    - The temperature should be between 60 and 68ºF
    - Relative humidity should be between 35 and 45%
- *Clean air quality.* The air in the storage facility should be free from pollutants (e.g., strong cleaning solution fumes). Dust can also be particularly damaging to digital media.
- *Damage prevention.* Protect your storage facility from:

- Pest infestation (e.g., mice, cockroaches, silverfish)
- Fire, smoke, and sprinkler damage
- Water damage, either from leaky pipes and leaky foundations, or from trapped moisture in walls, floors, and ceilings
- Damage from magnets, since magnets can damage digital data on magnetic storage media and thereby damage your electronic records You may also consider using a third-party storage facility that can store, access, and deliver records to you. Be certain that the third-party facility can meet your operational needs and all legal requirements.

Storage Facility Components
Determine your needs, priorities, and budget for the following components of a storage facility:
- *Storage aids.* Appropriate storage aids for the media may include shelving, file cabinets, and storage boxes. You may also need special cleaning supplies (e.g., lint-free dusting cloths, cotton gloves for handling sensitive media).
- *Facility map.* Consider creating a map of the storage facility so that you know which digital media are stored in each area.
- *Circulation control.* Develop a circulation log or other method for tracking facility access and records circulation. For a reliable circulation control system, you will need to develop an indexing system that accounts for all the digital media stored in the facility. A central authority should manage the index's content. Options include a paper list, card file, or database. You should be able to look at the circulation control index and determine the exact status of each stored media (e.g., if checked out, with whom and when due; if disposed of, when destroyed or disposed of; date of final disposition).

- *Acceptance system.* Develop a process that allows agency members to place records into the facility. Items submitted for storage should have, at minimum, the:
  - Name of the records series
  - Security classification — open or restricted
  - Record series inclusive dates
  - Unique locator number or identifier
  - Name of the agency and/or department submitting the item
  - Records disposal date
- *Special consideration for vital records.* Your vital records should have the best storage facility you can devise and afford. An off-site storage location is best. Be certain that your facility map shows the location of digital media containing your vital records, so that you can locate them immediately should a disaster occur.
- *On-going maintenance schedule.* Establish an ongoing system for maintaining the storage facility, including:
  - Regular cleaning, using chemicals that will not leave harmful residue or fumes
  - Procedures for checking deterioration of physical storage media (e.g., warped compact disks, cracked disks, moldy boxes)
  - Procedures for checking deterioration of electronic content (e.g., unreadable disks, inaccurately read records, missing or scrambled information on records)
  - On-going maintenance program (e.g., reading samples, spinning tapes to tighten them)
  - Regular maintenance of storage facility equipment (e.g., furnaces, air conditioners, dehumidifiers)
- *Disaster recovery plan.* As part of your policy, include a disaster recovery plan that provides a series of detailed actions (including who is responsible for executing each step of the disaster plan) if a disaster should occur at the storage facility. Include the response procedures for multiple types of disasters (e.g., flood, fire, smoke, explosion). The goal of the plan should be to have the facility operational and the greatest number of records recovered in the least amount of time. Train staff members and practice the disaster recovery plan. For more information on disaster recovery, refer to the Disaster Preparedness guidelines (leaflet # 16) https://scdah.sc.gov/sites/default/files/Documents/Records%20Management%20(RM)/Microfilm/Information%20Leaflets/Leaflet16.pdf and/or the Disaster Preparedness Quick Tips. https://scdah.sc.gov/sites/default/files/Documents/Records%20Management%20(RM)/Disaster%20Preparedness%20Quick%20Tips_090320.pdf Both are available on the State Archives' web site.
- *Access and use training.* Provide instruction and training for staff members who will be submitting items for storage, accessing stored records, and retrieving records. Established guidelines and training will enable you to provide service, stay organized, and protect your records.

A full list of SCDAH's storage facility requirements can be found here: https://scdah.sc.gov/sites/default/files/Documents/Records%20Management%20(RM)/storagestandards.pdf

Legal Framework
For more information on the legal framework you must consider when selecting digital storage media, refer to the *Records Management*

in an Electronic Environment chapter in the Electronic Records Management Guidelines and Appendix A6 of the *Trustworthy Information Systems Handbook guideline*. Also review the requirements of the:

• South Carolina Public Records Act [PRA] (*Code of Laws of South Carolina, 1976*, Section 30-110 through 30-1-140, as amended) available at https://www.scstatehouse.gov/code/title30.php, which supports government accountability by mandating the use of retention schedules to manage records of South Carolina public entities. This law governs the management of all records created by agencies or entities supported in whole or in part by public funds in South Carolina. Section 30-170 establishes your responsibility to protect the records you create and to make them available for easy use. The act does not discriminate between media types. Therefore, records created or formatted electronically are covered under the act.

• Health Insurance Portability & Accountability Act of 1996 [HIPAA] (Public Law 104-191), which establishes security and privacy standards for health information. The Act protects the confidentiality and integrity of "individually identifiable health information," past, present or future. Visit the HIPAA website at www.hhs.gov/ocr/hipaa for additional information.

Annotated List of Resources
Primary Resources
Byers, Fred R. *Information Technology: Care and Handling for the Preservation of CDs and DVDs — A Guide for Librarians and Archivists.* NIST Special Publication 500-252. Gaithersburg, MD: National Institute of Standards and Technology; Washington, D.C.: Council on Library and Information Resources. October 2003. www.itl.nist.gov
This guide discusses the physical characteristics of various optical media, as well as methods for their proper care and handling to ensure longest possible use in any given environment. A useful glossary is included.

COOL, Conservation OnLine
https://cool.culturalheritage.org/bytopic/electronic-records/electronic-storage-media/
A compilation of materials from other sources about electronic conservation, this web site includes links to resources on disaster recovery, electronic media, electronic formats, and storage environments.

Dollar, C.M. *Authentic Electronic Records: Strategies for Long-Term Access.* Chicago, IL: Cohasset Associates, Inc., 2000.
This book provides a comprehensive overview of electronic records management, with chapters on key concepts, long-term access, best practices, and developing an action plan. The book also includes a comprehensive bibliography, as well as useful appendixes covering such topics as technology for records management, electronic records preservation costs, conversion standards, media life expectancies, and a preservation metadata model.

Saffady, W. *Managing Electronic Records.* 2nd ed. Prairie Village, KS: ARMA International, 1998.
This book provides a thorough discussion of the basic principles of electronic records management. Chapters include concepts and

issues, electronic storage media and formats, file formats, inventorying electronic records, retention schedules, managing vital electronic records, and managing files and media. The book also includes a comprehensive glossary and bibliography.

Additional Resources

Ellis, J., S. McCausland, S. McKemmish, et al., eds. *Keeping Archives.* 3rd ed. Melbourne, Australia: Thorpe in association with the Australian Society of Archivists Inc., 2008. https://www.archivists.org.au/learning-publications/keeping-archives-3rd-ed *This book provides chapters that focus on the different aspects of planning and managing archives for all media, including paper and electronic formats. Special topics of interest to the electronic records archivist include special formats (e.g., moving images, sound recordings), and using computers and document imaging systems. A suite of six online training courses was developed to accompany the book and launched in 2016.*

ISO 17068:2017 *Information and Documentation- Trusted Third Party Repository for Digital Records* https://www.iso.org/standard/66760.html *This standard, from the International Organization for Standards, outlines the criteria for third party vendors to be considered trustworthy and able to provide reliable storage of electronic records. Reliable storage is required to ensure the integrity and authenticity of electronic records.*

National Archives and Records Administration (NARA) https://www.archives.gov/preservation/storage

For detailed technical information about records storage facilities, visit the web site of the National Archives and Records Administration. Even though state and local government agencies in South Carolina are not mandated to comply with the federal requirements for these facilities, the NARA guidelines offer valuable insight into best practices that should be considered for their design or maintenance.

South Carolina Department of Archives and History. *Trustworthy Information Systems Handbook.* Version 2, March 2007. https://scdah.sc.gov/sites/default/files/Documents/Records%20Management%20(RM)/Electronic%20Records/Trustworthy%20Information%20Handbook/TISHandbook.pdf *This handbook provides an overview for all stakeholders involved in government electronic records management. Topics center around ensuring accountability to elected officials and citizens by developing systems that create reliable and authentic information and records. The handbook outlines the characteristics that define trustworthy information, offers a methodology for ensuring trustworthiness, and provides a series of worksheets and tools for evaluating and refining system design and documentation.*

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