Preserving Electronic Records in Colleges and Universities

Presented by the NYS Archives

Supplemental Material and Additional Resources

new york state archives

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Tools to assist in digital preservation efforts

The goal of this section of the handout is to provide a sampling of some of the many tools that may assist in your individual preservation efforts. This is not to be considered a comprehensive listing nor an endorsement of the tools and products mentioned.

Each individual institution must determine the proper tools to address the requirements of your specific records and your environment.

***Identification & Transformation tools** – for converting electronic objects to open formats*

- Aid4Mail (www.aid4mail.com)

  Converts email into different formats

- Audacity (http://audacity.sourceforge.net/about/)

  Convert analog tapes and records into various digital formats

- DROID -Digital Record Object Identification (http://droid.sourceforge.net/wiki/index.php/introduction)

  Tool used for format identification.

- EMCAP (http://www.records.ncdcr.gov/EmailPreservation/technical_resources.htm)

  Preservation of Electronic Mail Collaboration Initiative from North Carolina Sate Archives

- Email Preservation Parser (http://siarchives.si.edu/cerp/parserdownload.htm)

  Tool from the Collaborative Electronic Records Project (CERP) of the Rockefeller Archive Center and the Smithsonian Institution Archives that converts e-mail into open formats.

- File Investigator (www.forensicinnovations.com/fiengine.html)

  Software identifies files type beyond just reading the file extension

- GIS Archiving Toolset - North Carolina State U. (www.lib.ncsu.edu/ncgdap/).

  Project aimed at collecting and preserving digital geospatial data resources

- JHOVE – JSTOR/Harvard Object Validation Environment (http://hul.hardvard.edu/jhove)

  Identifies and validates open formats

- MessageSave (www.techhit.com/messagesave)

  Microsoft Outlook plug-in that coverts Outlook email into other formats

- MediaCoder (http://mediacoderhq.com)

  Converts between digital audio and video recording formats

- XENA – XML Electronic Normalizing of Archives (www.xena.sourceforge.net).

  Xena detects the file formats of digital objects and converts digital objects into open formats for preservation.

Institutional repositories – *for housing, managing, and providing access to electronic content*

- Alfresco: open source software (www.alfresco.com)
- Duraspace: Dspace, Fedora, DuraCloud (www.duraspace.org)
- Greenstone suite: New Zealand (www.greenstone.org)
- Many commercial products (see www.AIIM.org and www.ARMA.org for vendor listings)

Web site crawler and capture services *– for capturing web site based content*

- Archive-IT - (http://archive-it.org)

  Subscription service from the Internet Archive allowing institutions to build and preserve collections of born digital content.
- Web Archiving Service - Calf. Digital Archive Service (http://webarchives.cdlib.org)

  Service allowing the capture, analysis and archiving of web sites and documents
- Web Harvester - (www.oclc.org/webharvester)

  Service offered by OCLC to capture and manage web content as part of cataloging and digital content management workflows.

Web site crawler and capture tools *– Open source software for capturing web site based content*

- Heritrix - (http://crawler.archive.org)

  The Internet Archive's open-source web crawler project
- HTTrack - (www.httrack.com)

  Allows a user to download a web site from the Internet to a local computer
- Web Archives workbench – open source tool (http://webarchivwkbnch.sourceforge.net)

  Provides an automated approach to web harvesting, based on archival principles.
- Web Curator Tool - (http://webcurator.sourceforge.net)

  Open-source workflow management application for selective web archiving and is integrated with the Heritrix web crawler
- Web-Harvest - (http://web-harvest.sourceforge.net)

  Collects desired Web pages and extract useful data from the pages

Digital Archives – *for protecting digital master files*

- Digital Archive – (www.oclc.org/digitalarchive)

  Service from OCLC providing a secure storage environment to manage and monitor the health of original digital files

- MetaArchive Cooperative - (www.metaarchive.org)

  Community cooperative were members safeguard their "born-digital" content by dynamically replicating and distributing digitally stored items to multiple file servers in multiple locations.

Additional tools and resources

- BagIT - (http://sourceforge.net/projects/loc-xferutils)

  Tools developed by the Library of Congress and their partners in the National Digital Information Infrastructure and Preservation Program (NDIIPP) for the purpose of validation, packaging and transfer of data that conforms to the BagIt specification.

- Digital Preservation - http://www.digitalpreservation.gov/partners/resources/tools/index.html

  List of tools and services designed, developed or used by NDIIPP partners

- Digital Preservation Recorder - (http://dpr.sourceforge.net/)

  The workflow tool developed by National Archives of Australia and works calls on Xena to perform file conversions into preservation formats. DPR is also an audit tool that records metadata associated with every step of the preservation process.

- ExamDiff Pro – (www.prestosoft.com/edp_examdiffpro.asp)

  Software that compares files simultaneously.

- Metadata Extractor (http://meta-extractor.sourceforge.net)

  Open-source tool that reads header information of a file to extract preservation metadata

- Rolling Checksum Checker – (http://sourceforge.net/apps/mediawiki/dpr)

  A part of the Digital Preservation Recorder tool set, this software is used to monitor the contents of the digital archive for data loss or corruption

Resources

The following are offered as additional resources to use in developing your digital preservation strategy and refining your implementation efforts.

Other digital preservation projects and programs

- CAMiLEON Project/Domesday Project; (www.si.umich.edu/CAMILEON)
- DRAMBORA: Digital Repository Audit Method Based on Risk Assessment (www.repositoryaudit.eu)
- Digital Curation Centre (www.dcc.ac.uk)
- Digital Preservation Coalition (www.dpconline.org)
- DPE: Digital Preservation Europe (www.digitalpreservationeurope.eu)
- DCMI: Dublin Core Metadata Initiative (www.dublincore.org)
- JISC: Supporting universities in the UK (www.jisc.ac.uk)
- InterPARES: International Research on Permanent Authentic Records in Electronic Systems (www.interpares.org)
- ICPSR: Inter-University Consortium for Political & Social Research (www.icpsr.umich.edu/icpsrweb/ICPSR)
- NARA Electronic Records Archives Project (www.archives.gov/era)
- National Digital Information & Infrastructure Preservation Program; Library of Congress (www.digitalpreservation.gov)
- PADI: Preservation Access to Digital Information; Library of Australia (www.nla.gov.au/padi)
- The Sedona Conference (http://www.thesedonaconference.org/)

Examples of digital preservation policies to aid in developing your own institution's policies

- Columbia University Libraries (www.columbia.edu/cu/lweb/services/preservation/dlpolicy.html)
- Cornell University Library Digital Preservation Policy Framework (http://commondepository.library.cornell.edu/cul-dp-framework.pdf)
- National Library of Australia's National Digital Preservation Policies (www.nla.gov.au/policy/digpres.html)
- NEDCC Digital Preservation Policy Template (www.nedcc.org/resources/soda/downloads/SoDAExerciseToolkit.pdf)
- OCLC (www.oclc.org/support/documentation/digitalarchive/preservationpolicy.pdf)
- University of Minnesota (http://conservancy.umn.edu/pol-preservation.jsp)

Institutions and Associations involved in preservation and records management

Archives and Records Organizations:

- **AIIM:** Association for Information and Image Management (www.aiim.org)
- **ARMA:** Association of Records Managers & Administrators (www.arma.org)
- **CoSA:** Council of State Archivists (www.statearchivists.org)
- **MARAC**: Mid-Atlantic Regional Archives Conference (www.marac.info)
- **NAGARA**: National Association of Government Archivists & Records Administrators (www.nagara.org)
- **NARA**: National Archives and Records Administration (www.archives.gov)
- **NHPRC**: National Historical Publications and Records Commission (www.archives.gov/nhprc)
- **NAA:** National Archives of Australia (www.naa.gov.au/)
- **SAA:** Society of American Archivists (www.archivists.org)
- **TNA:** The National Archives UK (www.nationalarchives.gov.uk)

Standards Organizations:

- **ANSI**: American National Standards Institute (www.ansi.org)
- **ISO**: International Organization for Standardization (www.iso.org)
- **NIST**: National Institute of Standards and Technology (www.nist.gov)

Technology Organizations:

- **OASIS**: Organization for the Advancement of Structured Information Standards (http://www.oasis-open.org)
- **W3C**: World Wide Web Consortium (www.w3.org)

Business Continuity – assisting in disaster preparedness and planning

- Business Continuity Institute (www.thebci.org)

  Members obtain guidance and support from fellow business continuity practitioners with over 5000+ members in 90 countries

- Disaster Recovery Journal (www.drj.com)

  Online and print publication focusing on business continuity planning.

Records Management

- DIRKS Manual: A Strategic Approach to Managing Business Information: National Archives of Australia. (www.naa.gov.au/records-management/systems/DIRKS/index.aspx)

  This methodology is an eight-step process to improve records management and information management practices, including the design and implementation of new records management systems.

- Trustworthy Information Systems Handbook, Minnesota State Archives (www.mnhs.org/preserve/records/tis/tis.html)
- Department of Defense 5015.2-Standard and the JITC Records Management Application Testing Program (http://jitc.fhu.disa.mil/recmgt)

  This standard for electronic records management systems was adopted by NARA. Providing listing of system meeting this certification.

Metadata

- Preservation Metadata Overview (www.dpconline.org/technology-watch-reports/download-document/88-preservation-metadata.html)
- *Understanding Metadata;* National Information Standards Organization (NISO). http://www.niso.org/publications/press/UnderstandingMetadata.pdf

Economics of digital preservation

- *The Open Archival Information System Reference Model: Introductory Guide* by Lavoie, Brian. (http://www.dpconline.org/docs/lavoie_OAIS.pdf). The OAIS Reference Model is freely available at http://public.ccsds.org/publications/archive/650x0b1.pdf
- *Sustaining the Digital Investment: Issues and Challenges of Economically Sustainable Digital Preservation*. (http://brtf.sdsc.edu/biblio/BRTF_Interim_Report.pdf)

Terminology & glossaries

- Technical Report for Information and Image Management – Glossary of Document Technologies available from AIIM international: ANSI/AIIM TR2-1998. (http://www.aiim.org/ResourceCenter/Article.aspx?ID=27664)
- Electronic imaging – Vocabulary: ISO standard 12651:1999 (http://webstore.ansi.org/)
- Richard Pearce-Moses. *A Glossary of Archival and Records Terminology*. (Society of American Archivists, 2005) http://www.archivists.org/glossary
- *Glossary of Records and Information Management Terms, 2nd Edition* (2000). (http://www.arma.org/standards/glossary/)

Media suitability and longevity

Media Selection Scorecard 'example'

The following was abstracted from The National Archives of the UK: *Selecting Storage Media for Long-Term Preservation 2008.*

The scorecard approach illustrated below uses a simple method for evaluating currently available media against selected criteria*. Each medium should be scored against the criteria on a scale of 1 (does not meet the criterion) to 3 (fully meets the criterion). As a general rule, no medium that scores less than 12 should be considered.

Media	**CD-R**	**DVD-R**	**Hard Disk**	**Flash Memory Stick and Card**	**Linear Tape Open (LTO)**
Longevity	3**	3**	2	1	3
Capacity	1	3	3	2	3
Viability	2	2	2	1	3
Obsolescence	1	2	2	2	2
Cost	3	3	1	3	3
Susceptibility	1	1	3	1	3
Total	**11**	**14**	**13**	**10**	**17**

The evaluation process should fully take into account variations within a media type. For example, a number of different dye and metal layer combinations are available for CD-Rs. In the example above, CD-Rs with a gold reflective layer and phthalocyanine-based dyes have been assessed, since recent research suggests that these are the most stable, and have the greatest life span.

* Bennett, J C, 1997, A framework of data types and formats, and issues affecting the long-term preservation of digital material. JISC/NPO studies on the preservation of electronic materials, *British Library Research and Innovation Report*, 50

** Note that although the *media* may sustain 100 years or more as some manufacturers may claim the *device* that is needed to read the media may not be fully functional or accessible for the same timeframe.

File format comparisons

The following charts provide a basic comparison of the different file formats for three categories of digital files: text, image and vector graphic files.

Textual file format comparison

Format	Standard	Multimedia	Navigation	Portability
ASCII	Yes	No	No	Yes
RTF	De Facto	No	No	Yes
XML	Yes	No	Yes	Yes
HTML	Yes	No	Yes	Yes
PDF	Yes	Yes	Yes	Yes
PDF/A	Yes	No	Yes	Yes

Image file format comparison

Format	Standard	Multimedia	Navigation	Compression
TIFF	Yes	No	No	Lossless
JPEG	Yes	No	No	Lossy
JPEG 2000	Yes	No	No	Lossless
PNG	Yes	No	No	Lossy
MPEG	Yes	Yes	No	Lossless and Lossy

Vector graphics file format comparison

Format	Standard	Multimedia	Navigation	Portability
SVG	Yes	Yes	Yes	Yes
IGES	Yes	No	No	Yes
CGM	Yes	No	No	Yes
EPS	No	No	Yes	No
DWG	No	No	No	No

Source: Electronic Records Preservation & Access; Charles Dollar, University of British Columbia

Standards

The following is a partial listing of some published standards to assist you in your preservation efforts. All the listed standards may be purchased online from the American National Standards Institute (ANSI) unless otherwise noted: (http://webstore.ansi.org/ansidocstore/default.asp)

Digital preservation

- Space data and information transfer systems -- Open archival information system -- Reference model: ISO 14721:2003
- Long-term preservation of electronic document-based information: ISO/TR 18492 (2005)
- Document management -- Electronic document file format for long-term preservation -- Part 1 Use of PDF 1.4 (PDF/A-1): ISO 19005-1:2005

Records Management

- Information and documentation - Records management - Part 1 General: ISO 15489-1:2001
- Information and documentation - Records management - Part2 Guidelines: ISO/TR 15489-2:2001
- Framework for Integration of Electronic Document Management Systems and Electronic Records Management Systems Technical Reports: ANSI/AIIM ARMA TR48-2004
- Vital Records Programs: Identifying, Managing, and Recovering Business-Critical Records: ANSI/ARMA 5-2003
- MoReq – Model Requirements for the Management of Electronic Records. Published by the Office for Official Publications of the European Commission, 2002, ISBN 92-894-1290-9. Copies available in several languages from http://www.cornwell.co.uk/moreq.html

Access controls & security

- Electronic imaging - information stored electronically - Recommendations for trustworthiness and reliability: ISO/TR 15801:2004
- Information technology - Security techniques - Security information objects for access control: ISO/IEC 15816:2002

- Information technology - Security techniques - Code of practice for information security management: ISO/IEC 17799:2005
- Information technology - Security techniques - IT network security - Part 1: Network security management: ISO/IEC 18028-1:2006
- Information technology - Security techniques - IT network security - Part 5: Securing communications across networks using virtual private networks: ISO/IEC 18028-5:2006

Capturing records

- Technical report on planning considerations addressing preparation of documents for scanning system: ISO 12652
- Electronic Imaging – Test target for black-and-white scanning of office documents: ISO 12653:2000
- Electronic imaging - Guidance for selection of document image compression methods: ISO 12033
- Electronic imaging – Guidance of document image compression methods: ISO/TS 12022:2001
- Planning Considerations, Addressing Preparation of Documents for Image Capture: ANSI/AIIM TR15-1997
- Paper Forms Design Optimization for Electronic Image Management: ANSI/AIIM TR32-1994

Legislation, standards and regulation

- Electronic imaging -- Recommendations for the management of electronic recording systems for the recording of documents that may be required as evidence, on WORM optical disk. ISO 12654
- Electronic Records as Documentary Evidence: CAN/CGSB-72.34-2005
- Legal acceptance of records produced by information technology systems: ANSI/AIIM TR31-2004

Metadata

- Records Management processes - Metadata for records: ISO 23081, part 1
- Country names: ISO 3166
- Date format: ISO 8601, BSI DISC PD2000
- Thesauri: ISO 2788, ISO 5964

Storage, search & retrieval

- The use of optical disks for public records: ANSI/AIIM TR25-1995
- Information retrieval protocol: ANSI Z39.50/ISO 23950

Software certification

- Design Criteria Standard for Electronic Records Management Software Applications, Published by the Assistant Secretary of Defense for Command, Control, Communications and Intelligence, 2002. US DOD 5015.2-STD. http://www.dtic.mil/whs/directives/corres/html/50152std.htm
- Electronic Recordkeeping Systems Standard. Published by Archives New Zealand, 2005. http://www.archives.govt.nz/continuum/dls/pdfs/ARC2529ElectronicRecordkeepingStandard.pdf
- Requirements for Electronic Records Management Systems (4 volumes). Published by The National Archives, 2002. http://www.nationalarchives.gov.uk/electronicrecords/reqs2002
- Victorian Electronic Records Management Strategy (VERS). Published by Public Record Office Victoria (PROV), standard 99/007, 2003. http://www.prov.vic.gov.au/vers/vers/default.htm

Glossary of terms in Electronic Records Preservation

American National Standards Institute (ANSI)

A standard-setting, non-governmental organization, which develops and publishes standards for "voluntary" use in the US

American Standard Code for Information Interchange (ASCII)

The most common format for text files in computers and on the Internet. In an ASCII file, each alphabetic, numeric, or special character (including spaces and carriage returns) is represented with a 7-bit binary number (a string of seven 0s or 1s).

ANSI

See "American National Standards Institute"

Archive

v. (IT) Create a backup copy of an electronic file for non-current, but not permanent, storage. (Arch) Capture an electronic record for permanent retention. Usually requires additional indexing or relocating of records to be maintained for future reference. (RM - slang) Sometimes used inappropriately to refer to moving inactive records to off-site storage, *e.g.* "We *archived* last year's records down to the basement storeroom."

Archives

n. (1) A collection of non-current records of an organization or institution preserved because of their continuing historical value; also referred to as *archival materials* or *archival holdings*. (2) The organization or agency responsible for selecting, accessioning, preserving, and making available records determined to have permanent or continuing value. (3) The building or portion of a building in which an archival institution is located.

ASCII

See "American Standard Code for Information Interchange"

Audit trail

A record of what operations someone has performed (additions, deletions, modifications) while on a computer system during a specific period of time

Bit

The smallest unit of information (normally either a 0 or a 1) recognizable by a computer. A contraction of "binary digit".

Block

A grouping of data stored as a unit on an external storage medium and dealt with as a unit by the computer for input or output.

Born Digital

Digital files that were created in digital form. Does not include digital files created by scanning paper to create a digital image file.

Byte

The group of bits that represents a character to a computer, normally 8 bits.

CD-R

See "Compact Disc, Recordable"

CD-ROM

See "Compact Disc, Read Only Memory"

CD-RW

See "Compact Disk, Rewritable"

Compact Disc, Read Only Memory (CD-ROM)

The disk is made of clear polycarbonate plastic, covered with a layer of dye, a thin layer of aluminum, and a protective lacquer layer over that. Data is encoded by a laser in the form of bumps or pits impressed in the dye which a laser later reads and interprets as light reflected from the aluminum layer. It is capable of storing approximately .65 GB or 650 MB.

Compact Disc, Recordable (CD-R)

A type of WORM, in that is allows only one recording, that is made and read in the same manner as a CD-ROM, however, it has a layer of organic polymer dye as the recording medium

Compact Disc, Rewritable (CD-RW)

A type of Magneto-Optical disc and similar to a CD-R, but uses an alloy (metallic) layer instead of dye as the recording medium which can be transformed to and from a crystalline state repeatedly; also called rewritable CDs

Compression (Data compression)

A software or hardware process that reduces computer data or images so that they occupy less storage space and can thus be transmitted faster and easier. Data compression is encountered in computer, audio, and video systems. See related terms Lossless, Lossy, and Decompression.

Computer-output microfilm

The process of converting electronic data to images microfilm or microfiche; microfilm or microfiche produced using that process

Digital Linear Tape (DLT)

A type of half-inch magnetic tape that is commonly used for storing large GIS databases or for backing up mainframes. It can hold 2 to 70 GB. It uses compression to transfer data quickly and in large quantities.

Digital Versatile Disc, Read Once Memory (DVD-ROM)

The disk is made of clear polycarbonate plastic, covered with a layer of dye, a thin layer of aluminum, and a protective lacquer layer over that. Data is encoded by a laser in the form of bumps or pits impressed in the dye which a laser later reads and interprets as light reflected from the aluminum layer.

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Digital Versatile Disc, Rewritable (DVD-RW)

A type of Magneto-Optical disc and similar to a DVD-R, but uses an alloy (metallic) layer instead of dye as the recording medium which can be transformed to and from a crystalline state repeatedly.

DLT

See "Digital Linear Tape"

DoD 5015.2-STD Design Criteria Standard for Electronic Records Management Software Applications

A functional design standard for software programs that manage electronic and other records. Issued by Department of Defense to apply to all DoD activities, and endorsed by the National Archives and Records Administration for use by all Federal agencies. The Joint Interoperability Test Command (JITC) tests in-house and commercial electronic records management applications (RMAs) for compliance to the standard, and certifies those that pass. Compliant products and other information about DoD 5015.2-STD are listed at http://jitc.fhu.disa.mil/recmgt/index.html.

DVD-R

See "Digital Versatile Disc"

DVD-ROM

See "Digital Versatile Disc, Read Only Memory"

DVD-RW

See "Digital Versatile Disc, Rewritable"

Electronic record

(definition from ESRA) "information, evidencing any act, transaction, occurrence, event, or other activity, produced or stored by electronic means and capable of being accurately reproduced in forms perceptible by human sensory capabilities" (simple definition) a record that is in electronic form

Electronic Signatures and Records Act (ESRA)

New York legislation passed in 1999 to ensure that electronic signatures are legally binding in government and to clarify the authority of New York government entities to create and maintain records created by computers in electronic form

Emulation

A means for overcoming technological obsolesce through the use of new hardware and software to allow an information technology to imitate another

ESRA

See "Electronic Signatures and Records Act (ESRA)"

Extensible Markup Language (XML)

A file format that facilitates the use of SGML documents on the Internet as it is a subset of SGML. Its language is similar to HTML, however XML describes the content, within the markup symbols, in terms of what data is being described. (XML, for instance, could allow you to search for "Saturn" online only where the term was referring to an automobile, only where it was referring to a planet, or only where it was referring to a zodiacal sign.)

File Transfer Protocol (FTP)

The protocol used over the Internet that allows the viewing, downloading, and uploading of large files quickly from a website

FTP

See "File Transfer Protocol"

GIF

See "Graphics Interchange Format"

Graphics Interchange Format (GIF)

A lossless file format for displaying bit map images (graphics) on the Internet. It was developed by CompuServe and uses a proprietary compression technique, thus it is not in the public domain and PNG (non-proprietary) has been developed to replace it.

HTML

See "Hypertext Markup Language (HTML)"

Hypertext Markup Language (HTML)

The standard computer language used to add tags to a digital document so it can be interpreted by a web browser

International Organization for Standardization (ISO)

A worldwide federation, founded in 1947, of national standards bodies from some 100 countries, one from each country

ISO

See "International Organization for Standardization"

Joint Photographic Experts Group (JPEG)

Devised the standard for still image compression (lossy), sanctioned by the International Standards Organization and CCITT; used for photographic images, not for text images

JPEG

See "Joint Photographic Experts Group"

Lossless compression

A compression process that reduces the storage space needed for an image file without loss of data. If an image has undergone lossless compression, when decompressed it will be identical to the image before it was compressed. GIF and PNG are examples. See related terms Lossy, Compression, and Decompression.

Lossy compression

A compression process that reduces the storage space needed for an image file, but which discards some information that is "redundant" and not perceptible to the human eye. If an image that has undergone lossy compression is decompressed, it will differ from the image before it was compressed, even though the difference may be difficult for the human eye to detect. JPEG is an example. See related terms Lossless, Compression, and Decompression.

Magneto-Optical disc

Type of optical storage media on which data can be recorded repeatedly. It has an alloy (metallic) layer that a laser heats allowing magnetic properties to be changed (includes CD-RW and DVD-RW).

MAME

See "Multiple Arcade Machine Emulator"

Metadata

Data about the data; the description of the data resources, its characteristics, location, usage, and so on. Metadata is used to identify, describe, and define user data.

Migration

The periodic transfer of data from one electronic system to another, retaining the integrity of the data and allowing users to continue to use the data in the face of changing technology; sometimes called "data migration"

Motion (or Moving) Picture Experts Group (MPEG)

An international standard for digital video and audio (lossy) compression (includes MPEG-1, -2, -4 and MP-3)

MPEG

See "Motion (or Moving) Picture Experts Group"

Multiple Arcade Machine Emulator (MAME)

A computer program that simulates the hardware and software of old and new video games

Native format

The original file format of an electronic record

PDF

See "Portable Document Format"

Pixel

From PICture ELement. The smallest unit of a digitized picture or video display. Also referred to as *dots*, and measured in terms of *dots per inch* **(DPI)**. The greater the number of pixels in a square inch of a displayed image, the greater is the *resolution* or sharpness of the image to the human eye. Higher resolution image files are larger and take considerably more storage space than lower resolution image files.

PNG

See "Portable Network Graphics"

Portable Document Format (PDF)

A file format that has captured all the elements of a printed document as an electronic image

Portable Network Graphics (PNG)

A lossless, non-proprietary file format for displaying graphics on the Internet and intended as a replacement for GIF

Re-writable

Optical media from which data can be erased and new data added

Refresh

The copying of the stream of bits of a record from old to new media

Rich Text Format (RTF)

A file format, developed by Microsoft that allows you exchange text files between different word processors in different operating systems

RTF

See "Rich Text Format (RTF)"

SGML

See "Standard Generalized Markup Language"

SQL

See "Standard Query Language"

Standard Generalized Markup Language (SGML)

A computer language of which HTML and XML are subsets. SGML describes the structure of a document rather than its physical characteristics or format.

Structured Query Language (SQL)

The standard interactive and programming language for getting information from and updating a relational database

Tagged Image File Format (TIFF)

A lossless file format for storing color and gray scale images and used as a standard for the maintenance of long-term records

TIFF

See “Tagged Image File Format”

Unicode

A format for text files in computers and on the Internet. It is more comprehensive than ASCII; it is a 16-bit system, thus it contains a large number of characters including those supported by ASCII as well as many classical and historical texts in a number of languages, mathematical and other symbols.

WORM

See "Write Once Read Many"

Write Once Read Many (WORM)

Optical storage device on which data is permanently recorded and cannot be altered. CD-R is a type of WORM.

XML

See "Extensible Markup Language"

Sources used for this glossary

Acknowledgement of the following resources were used in the compilation of this glossary of terms:

- *California Electronic Records Management Handbook, Appendix 1- Glossary of Records Management Terms*. California Department of General Services. March 2002
- Free On-line Dictionary of Computing (FOLDOC). foldoc.doc.ic.ac.uk/foldoc/index.html.
- *Glossary of Records and Information Management Terms, 2nd Edition*. ARMA International: Prairie Village, KS. 2000.
- *Managing Electronic Records*. National Archives and Records Administration Instructional Guide Series. National Archives and Records Administration, Office of Records Administration: Washington, D. C. 1990.
- *Records Glossary*. United States Environmental Protection Agency. http://www.epa.gov/records/gloss/index.htm. March 2004.