Distributed Digital Preservation Workshop for ETDs

Gail McMillan, Virginia Tech
Martin Halbert, Emory University
Bill Donovan, Boston College
MetaArchive Cooperative

12th International Symposium on ETDs
University of Pittsburgh
June 10, 2009

Instructors

- Gail McMillan
  - Director, Digital Library and Archives
  - University Libraries, Virginia Tech
- Martin Halbert
  - Director, Digital Programs and Systems, Emory University
  - President, MetaArchive Services Group
- Bill Donovan
  - Digital Imaging Librarian, Boston College
  - Manager of Digitization Lab in the O'Neill Library
  - ETD Administrator

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Attendees

- 30 universities
- 2 national libraries
- 5 vendors

- Africa, Europe, Latin America, Middle East, North America

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Agenda

- ETDs and preservation needs: Survey Results
- Distributed digital preservation network (DDPN) overview
  - MetaArchive Cooperative and the NDLTD preservation strategy
- Collection Management for preservation readiness
  - Organizing your ETD collections
  - Metadata: Conspectus Database
- MetaArchive Cooperative and its members
- New member's perspective: Boston College

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ETDs and Preservation Needs

Gail McMillan
Digital Library and Archives
Virginia Tech

What is Digital Preservation?

- Systematic management of digital works *over an indefinite period of time*
  - Processes and activities that ensure the continued access to works in digital formats
  - Requires ongoing attention--constant input of resources: effort, time, money
  - Technological and organizational change are obstacles for preserving beyond a few years.

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NDLTD Preservation Strategy: MetaArchive Cooperative

- MetaArchive is a PLN: Private LOCKSS (i.e., distributed preservation) Network
- Programmatically harvests ETDs from partners
  - Secure access: only authorized partners' servers
- Preserves ETDs among partners' servers
  - Low cost to administer and run
  - Standard hardware, open-source software
  - Audits and repairs ETDs as needed
- ETD Preservation Network is a Dark Archive.

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ETD Preservation Survey

- Gauge the digital library community's interest in an ETD-specific archive
- 6 academic listservs
  - ARL, ASERL, CGS, DLF
  - NDLTD, ETD
- 14 multiple-choice and short answer questions
- Dec. 13, 2007 - April 10, 2008
- 96 completed surveys

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digital library and archives

Viewing Results for Digital Preservation of ETDs

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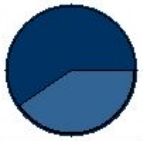
1. Does your institution accept electronic theses and dissertations (ETDs)?

If not, please go to no. 9 below.

19.79%	No	(19/96 responses)
80.21%	Yes	(77/96 responses)

97.96% of the people who took this survey (96 / 98) answered this question.

1a. If so, does your institution accept only electronic versions?



59.74%	No	(46/77 responses)
40.26%	Yes	(31/77 responses)

78.57% of the people who took this survey (77 / 98) answered this question.

1b. If so, does your institution also maintain print copies?

44%	No	(33/75 responses)
56%	Yes	(42/75 responses)

76.53% of the people who took this survey (75 / 98) answered this question.

ETD File Formats

- 85% PDF
- 30% JPG
- 27% WAV
- 24% GIF
- 23% HTML, MOV
- 21% AVI, MP3

MetaArchive Conspectus Database

2.6%	.ppt	(8/308 responses)
1.95%	.qt	(6/308 responses)
4.87%	.tif	(15/308 responses)
4.22%	.xml	(13/308 responses)
6.49%	.wav	(20/308 responses)
5.19%	Any format	(16/308 responses)
6.17%	Other formats	(19/308 responses)
3.25%	.png	(10/308 responses)
19.81%	.pdf	(61/308 responses)
4.55%	.mpg	(14/308 responses)
5.19%	.mp3	(16/308 responses)
2.27%	.aif	(7/308 responses)
5.19%	.avi	(16/308 responses)
4.22%	.doc	(13/308 responses)
5.84%	.gif	(18/308 responses)
5.52%	.html	(17/308 responses)
7.14%	.jpg	(22/308 responses)
5.52%	.mov	(17/308 responses)

Platforms and Institutional Repositories hosting ETDs

- 26% DSpace
- 13% ETD_db
- 3% Fedora
- 1% Eprints

- 29% Locally developed systems
- 29% Others

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Structure of ETD Collections

- 25% Subject-like categories
- 21% Everything-in-one
- 21% Year
- 9% Accessibility
- 7% Degree
- It's best to group ETDs into discrete and finite units such as annual cumulations.

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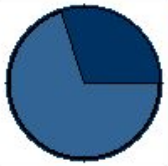
8. Does your institution have a formalized preservation plan for its ETDs?

If so, and you are willing to share, please send it to gailmac@vt.edu.

72.92%	No	(70/96 responses)
27.08%	Yes	(26/96 responses)

97.96% of the people who took this survey (96 / 98) answered this question.

9. Do you have experience with or knowledge of LOCKSS-based preservation networks?

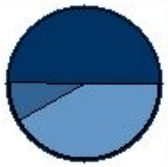


29.79%	No	(28/94 responses)
70.21%	Yes	(66/94 responses)

95.92% of the people who took this survey (94 / 98) answered this question.

10. Would your institution be interested in participating in an ETD-specific LOCKSS-based collaborative distributed digital archive sponsored by the NDLTD?

If not, please go to no. 11 next.



50%	Maybe	(48/96 responses)
8.33%	No	(8/96 responses)
41.67%	Yes	(40/96 responses)

97.96% of the people who took this survey (96 / 98) answered this question.

NDLTD Preservation Strategy

- NDLTD and MetaArchive Cooperative
  - Help higher education institutions provide long-term open access to ETDs
  - Institutions can achieve this goal by becoming part of the ETD Preservation Network.
- Participate in an NDLTD MetaArchive Preservation Network Workshop
- Join: NDLTD and MetaArchive

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NDLTD Preservation Strategy

- Hardware
- Software
- Access
- Intellectual Property
- Organizing ETD Collections
- Standards
- Harvest Frequency
- Institutional Workflow

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NDLTD Preservation Strategy with the MetaArchive Cooperative

http://scholar.lib.vt.edu/theses/preservation/NDTLDPlan.pdf

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MetaArchive and Distributed Preservation

Dr. Martin Halbert
President, MetaArchive Cooperative
Distributed Digital Preservation for ETDs Workshop
University of Pittsburgh
Pittsburgh, PA
Wednesday, June 10, 2009

Session Questions

- What is the MetaArchive Cooperative? Why did we form it?
- What is distributed digital preservation? Why is it important for ETD preservation?
- What is LOCKSS? How does MetaArchive use the LOCKSS software?

What led to MetaArchive?

- Planning meetings by librarians and archivists in 2002-2003 on concerns about preserving digital archives
- Sense that we needed to do something practical to help each other preserve our data
- Not based on studies, just the observation of our anxieties about keeping our (expensive) digital materials preserved and viable.

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The Data Loss Problem

From NDIIPP Website on the Importance of Digital preservation (http://www.digitalpreservation.gov/importance/):

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The Gap in Digital Preservation Programs

- 66% of cultural heritage institutions (academic libraries, archives, art museums, public libraries, and other similar kinds of institutions) report that no one is responsible for digital preservation activities
- 30% of all archives have been backed up one time or not at all

Source: 2005 NEDCC Survey by Bishoff and Clareson

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The Need for Collaborative Approaches

"The increased number and diversity of those concerned with digital preservation—coupled with the current general scarcity of resources for preservation infrastructure—suggests that *new collaborative relationships that cross institutional and sector boundaries could provide important and promising ways to deal with the data preservation challenge.* These collaborations could potentially help spread the burden of preservation, create economies of scale needed to support it, and mitigate the risks of data loss."

- The Need for Formalized Trust in Digital Repository Collaborative Infrastructure

NSF/JISC Repositories Workshop (April 16, 2007)

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Backups versus Digital Preservation

What differentiates a schedule for data backups from a digital preservation program?

- ***Backups are tactical measures.*** Backups are typically stored in a single location (often nearby or collocated with the servers backed up) and are performed only periodically. Backups are designed to address short-term data loss via minimal investment of money and staff time resources. Backups are better than nothing, but not a comprehensive solution to the problem of preserving information over time.

- ***Digital preservation is strategic.*** Preserving information over long periods requires systematic attention rather than benign neglect or unthinking actions.

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Institutional Repositories versus Digital Preservation

What differentiates an IR program from a distributed digital preservation program?

- ***The IR is not distributed.*** The IR is a centralized approach aimed at managing information flow within the institution. It typically does not attempt to securely cache prioritized content at multiple geographically dispersed sites.

- ***DDP mobilizes efforts of multiple institutions.*** A digital preservation program entails a geographically dispersed set of secure caches of critical information. A true digital preservation program will require multi-institutional collaboration and at least some ongoing investment to realistically address the issues involved in preserving information over time.

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Secure and Distributed Cache Networks

Why are the characteristics of geographically distribution and security so important? This strategy maximizes survivability of content in both individual and collective terms:

- **Security** reduces the likelihood that any single cache will be compromised.
- **Distribution** reduces the likelihood that the loss of any single cache will lead to a loss of the preserved content.

By creating a collaborative network for secure and distributed preservation, a group can also work together on more complex issues such as format migration.

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Both Technical and Organizational Networking are Required

- A single cultural heritage organization is unlikely to have the capability to operate several geographically dispersed and securely maintained servers
- Collaboration between institutions on technological solutions is essential
- Similarly, inter-institutional agreements must be put in place or there will be no commitment to act in concert over time

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Shared Archiving Fails without a Pre-coordinated DDP Network in Place

Lessons from the NDIIPP Archive Ingest and Handling Test (AIHT) and other shared archiving experiments:

- Encounter many unexpected incompatibilities because of different systems and data packaging
- Realization that much of the cost in preserving digital material is in coordinating the organizational and institutional imperatives of preservation, and not the technological costs of storage space

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MetaArchive

A distributed digital preservation cooperative for digital archives

- Established under the auspices of and with funding from the National Digital Information and Infrastructure Preservation Program (NDIIPP) of the Library of Congress
- A functioning DDP network and cooperative for libraries and other cultural memory organizations
- Sustained by cooperative fee memberships, LC contracts, and other sponsored funding
- Provides training and models for other groups to establish similar distributed digital preservation networks
- Fosters broader awareness of digital preservation issues

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MetaArchive Phase I (2004-2007)

- Developed a working model for distributed digital preservation (DDP) in which institutions with shared subject domain focus mobilize for mutual benefit
- Developed a technical solution for DDP based on a reuse of LOCKSS technology, in the form of a separate network with higher capacity nodes
- Created an administrative nonprofit corporation
- Began preserving via DDP hundreds of collections from many different organizations

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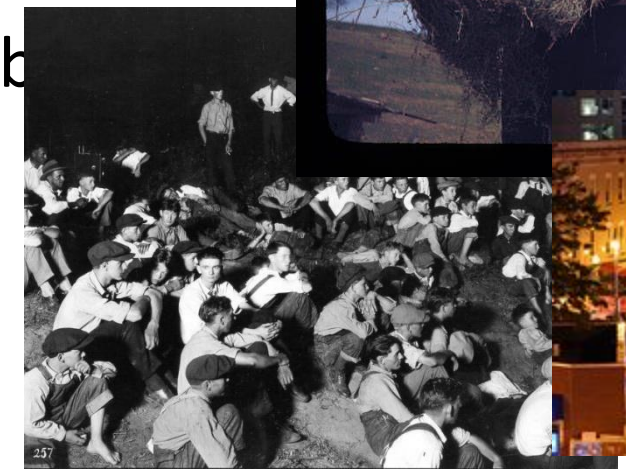
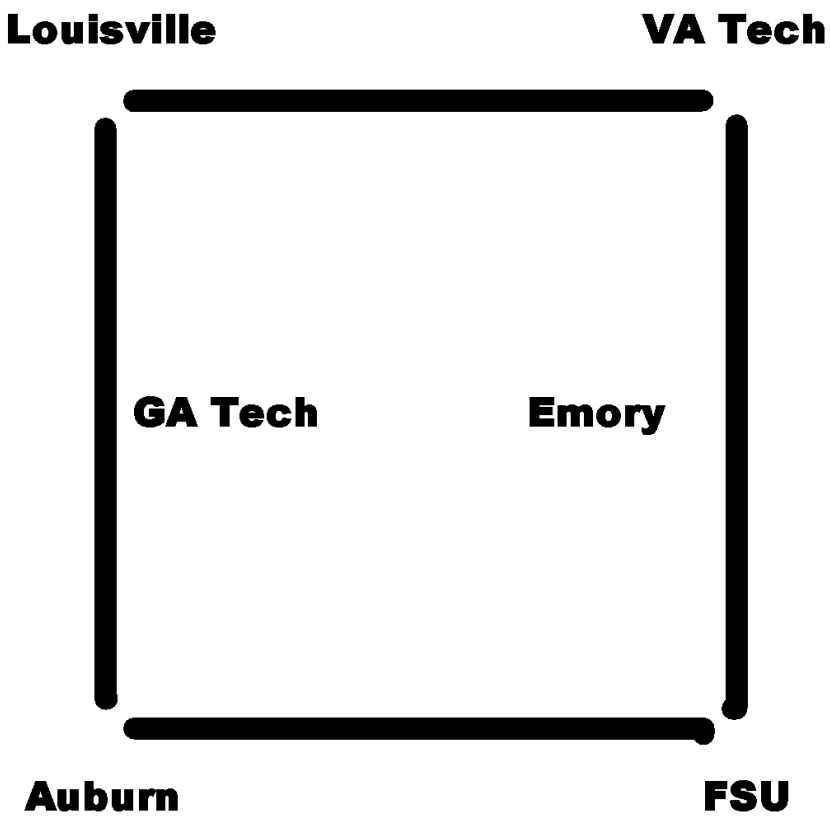
Collection Variety

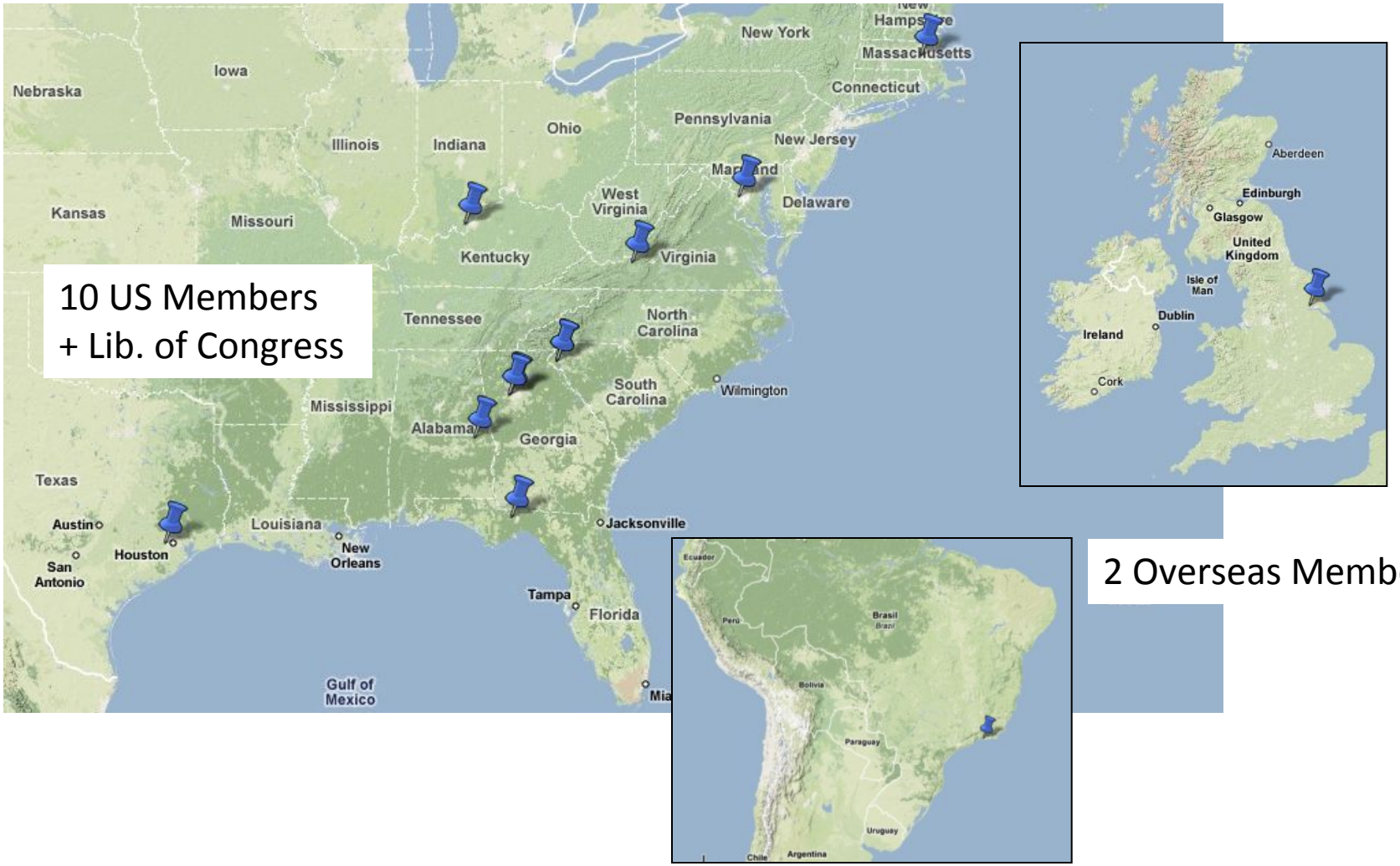
- Collections include:
  - Images
  - Text files
  - Multimedia files
  - Datasets
  - Program executab



MetaArchive Founding Members



Membership Distribution



Current Members

- Auburn University
- Boston College
- Clemson University
- Emory University
- Florida State University
- Folger Shakespeare Library
- Georgia Tech
- Library of Congress (Sponsor)
- Pontifical Catholic University of Rio de Janeiro
- Rice University
- Hull University Wilberforce Institute
- University of Louisville
- Virginia Tech

Catalytic Efforts

- Began hosting workshops in distributed digital preservation strategies in 2007
  - Instruct new MetaArchive members in processes
  - Advise other groups considering DDP approaches
- Assisted in creation of two additional DDPNs
  - Alabama – state digitization projects
  - Arizona – state government records

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Technology: Building on Top of LOCKSS as a Solution for Preserving Digital Archives

- Conspectus Database (Original)
  - Curators enter collection level entries for collections
  - Meant to be used for cooperative prioritization in DDP selection and decision-making activities
  - Not interactive with some key MetaArchive systems (Cache Manager, Ingest Plugins)
- Second Generation Conspectus Database
  - Now in development
  - Integrates operation of all network functions
  - Being designed in concert with guidance from other PLNs, hopefully in ways that enable re-use

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Organizational Agreements and Models

- Developed a new cooperative with guidance from both legal team, librarians, and intellectual property specialists
- Created core organizational documents in 2006: charter, membership agreement, papers of incorporation, business plans, etc.
- Allows members to understand their commitment and liability clearly

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Collection Foci: Growing Archives in Subject & Genre Domains

- **Southern Digital Culture** (initial collecting area, founding members were Southeastern)
- **Transatlantic Slave Trade Historical Data** (made cooperative international)
- **Electronic Theses and Dissertations** (inter-consortia strategic alliance with NDLTD)
- **Early Modern Literature** (broad new area, with Folger Shakespeare Library as cornerstone)
- Additional archives in planning stages

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Active Collaborations with Other Efforts

- **LOCKSS** (collaborative development of LOCKSS Cache Manager)
- **Data-PASS Alliance** (developing in-common standard for Private LOCKSS network interoperation standard and tools)
- **ECHO DEPository Project** (PLN interoperation standard using HandS)
- **SDSC Chronopolis** (PLN/ SRB interoperation testing and bridges)

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MetaArchive Phase II (2007-2010)

- Established additional distributed archives
- Became international with the addition of Hull University in UK
- Doubled in size 2008-2009, and plan to double in size each year for next three years
- With funding from NHPRC will now provide consulting and outreach services on the MetaArchive model for DDP services

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Institutional Roles

- Preservation Sites are entities responsible for the ongoing activity of preserving digital content. At a minimum, every preservation site must include responsible staff and a node server of the relevant preservation network. Preservation sites collectively comprise a preservation network.

- Development Sites are responsible for technical development of the computer systems that enable the preservation network. Obviously, development sites may also be preservation sites and/or contributing sites.

- Contributing (Content) Sites are institutions that need to preserve digital content, and therefore decide to contribute digital content into the preservation network. The preservation network acts for the common good to preserve the at-risk content submitted by the contributing sites. Contributing sites may also be preservation sites.

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Factors to Consider

- What level of participation are new MetaArchive members interested in? Running a node? Simply using the existing network?
- Metadata for items must be reposited as well, in a way that enables recovery in the case of need
- Whose job is this going to be in the organization?
- What are the highest priority items for distributed digital preservation?

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THE GREATEST THREAT

to digital assets is not fire, flood, or theft. It's the assumption that cultural memory organizations have taken the requisite steps to preserve them.

Too often, we haven't.

That is why the MetaArchive Cooperative is fostering a community-based approach to digital preservation. Our members participate in a secure, cost-effective solution to the threat of data loss. As a community, we are building our own trustworthy digital repository and becoming skilled cultural stewards of the digital age.

Participating Institutions:
Auburn University
Boston College
Clemson University
Emory University
Florida State University
Folger Shakespeare Library
Georgia Tech
Library of Congress
Rice University
University of Hull
University of Louisville
Virginia Tech

The NDLTD/MetaArchive ETD Archive

Dr. Martin Halbert
President, MetaArchive Cooperative
Distributed Digital Preservation for ETDs Workshop
University of Pittsburgh
Pittsburgh, PA
Wednesday, June 10, 2009

Session Questions

- Overview of the pilot program for the NDLTD/MetaArchive ETD Archive
- Goals
- Timeline
- Scenarios for preserving ETD collections
- Roles and responsibilities of new pilot project collaborators
- How to participate

NDLTD/MetaArchive ETD Archive Pilot Program - Goals

- Analyze and understand different scenarios for offering MetaArchive preservation services for NDLTD members (hubs vs. cloud)
- Test and document procedures and practices for NDLTD members to use MetaArchive network for preservation purposes
- Model joint NDLTD/MetaArchive membership fees
- Soliciting wider NDLTD involvement as of ETD 2009

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NDLTD/MetaArchive ETD Archive Program - Timeline

- Jul 2009:
  - Selecting additional program participants
- Nov 2009:
  - Concluding pilot project and transitioning to standard operations
- Mar 2010:
  - Hope to move forward on next steps for tools development

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Scenarios Explored for Preserving ETD Collections

- Hub and Spoke Model
  - Identify small number of NDLTD/MetaArchive service providers who will offer preservation functions for all NDLTD members
- Cloud
  - Do not differentiate NDLTD/MetaArchive nodes
  - Build up more joint members

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Seeking Additional NDLTD/MetaArchive Members

- Looking for additional participants
- Collaborators must join MetaArchive (low cost!) in addition to NDLTD
- Participants may either run a node or help model contributing member procedures
- ideally, would like new members willing to participate in development of tools

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NDLTD/MetaArchive ETD Archive Pilot Program - How to Participate

- Decide if you want to participate in the NDLTD ETD preservation program
- What member level are you interested in?
- If interested, contact Gail McMillan (gailmac@vt.edu)

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ETD Collections Management for Preservation Readiness

Gail McMillan
Digital Library and Archives
Virginia Tech

Best Practices: Unique Directory Names

- Standardized, uniform, easy to decipher
- Timestamps
  - etd-mmddyyyy-tttttt
  - http://scholar.lib.vt.edu/theses/available/etd-10022007-144864
  - ETD submitted on Oct. 2, 2007at 2:48:64 pm
- Use same naming convention for scanned and born-digital ETDs

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Best Practices: File Names

- etd.pdf
  - If file names are not unique, directory names must be unique
  - May not be good for local management
- Lastname_initials_doctype_year.format
  - McMillanGM_T_1981.pdf
  - SoundararajanS_D_2010.pdf
  - SoundararajanS_D_2010_copyright.pdf

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Best Practices: Archival Units

- Discreet static (unchanging) units
  - Annual ingest into preservation caches
- >10 GB
  - Divide annual directories into subunits

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Best Practices: Triage for ETDs

- Inconsistent practices in directory structures, metadata, and file naming conventions
- Rename, rearrange files or
- Creative strategies needed
- Adapt the existing situation to find, harvest, and ingest the files into the preservation network

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Best Practices: Triage for ETDs

- How?
  - Recognize there is a problem.
  - Stop poor and practices.
  - Isolate the problem files.
- Data wrangling
  - Define problem
  - Adopt good (preservation) strategies.
    - Create a direct path for ingest into preservation network
    - Everything that doesn't follow best-practices becomes one Archival Unit

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Best Practices: Web Accessible

- Keep ETDs on live, spinning discs
- Not on CDs or other static storage devices
- Avoid problems: finding those discs, loading them onto spinning discs, rectifying errors and failed media
  - Even gold CDs regularly fail!
- Declining cost of online storage

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Best Practices: Web Accessible

- Public
- NDLTD preservation partners only
  - Restricted and Withheld/Embargoed ETDs
  - Add IPs to server's firewall to enable access
- Permission
  - "LOCKSS system has permission to collect, preserve, and serve this Archival Unit"

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Collection With Year Volumes

LOCKSS Manifest Page

Collection Info:

- Institution: INSTITUTION
- Contact Info: CONTACT ...

A Collection that Sorts Content By Year

Links for LOCKSS to start its crawl:

- index - local directory listing

LOCKSS system has permission to collect, preserve, and serve this Archival Unit.

Best Practices: Metadata Discipline

- Describe the institution's individual ETDs
  - ETD MS: ETD Metadata Standard

    http://www.ndltd.org/standards/metadata/etd-ms-v1.00-rev2.html
  - MARC: MAchine Readable Cataloging

    http://www.worldcat.org/
- Describe the institution's ETD collection
  - MetaArchive Conspectus Database

    http://www.metaarchive.org/conspectus

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MetaArchive Conspectus Database

- Overview of each collection being preserved in the ETD Dark Archive
  - Descriptive information
  - Network administration information
  - Public awareness function
  - Future considerations, e.g., format migration
- Collection-level Metadata Specification
  - Thoroughly defines the metadata elements
  - http://metaarchive.org/pdfs/conspectus_md_2005.html

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MetaArchive Conspectus: Descriptive Data

- Details explaining the ETD collection to be preserved
  - Title: formal name of the ETD collection
  - Alternative Title: other names for the collection
  - Description: explain or define the collection
  - Subjects: describe the collection using terms from a thesaurus or controlled vocabulary

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MetaArchive Conspectus: URI

- Uniform Resource Identifier: usually a locator (URL) or name (URN)
  - Collection's URI
  - Institution identifier: university assigned control number for the collection
  - Is available via: public URL

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MetaArchive Conspectus: Coverage

- Describe the collection in space and time
  - Spatial Coverage: geographical location--place or areas associated with the collection
  - Temporal Coverage: time periods associated with the collection
  - Accumulation Date Range: span of dates when the collection was assembled
  - Contents Date Range: dates of creation of the digital collection

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MetaArchive Conspectus: Accrual Information

- Details about the anticipated growth of the ETD collection
  - Accrual Periodicity: frequency with which items will be added to the collection
    - Daily, Weekly, Monthly, …No longer adding
  - Accrual Policy: approach adopted to add items to the collection or anticipated growth

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MetaArchive Conspectus: Data Description

- Formatting, size and language information
  - Format Characteristics: physical or digital characteristics of the files in the collection

    audio: wav image: jpg text: pdf video: mpeg
  - Language of the content of the collection
  - Type: genre or category of the content of the collection
    - Text, sound, datasets, software, animation, etc.
  - Extent: size or duration of the entire collection

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MetaArchive Conspectus: Rights and Ownership

- Description of the collection's intellectual property
  - Creator: originator of the ETD collection
  - Publisher: entity responsible for making the ETDs available
  - Rights: statement about who owns the copyright
  - Access Rights: statement of restrictions placed on the collection, including allowed users, charges, etc.

    Restricted Unrestricted
  - Custodial History: changes in ownership, custody of the collection, integrity and interpretation; provenance
  - Manifestation: reformatting quality attribute

    Access Preservation Replacement

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MetaArchive Conspectus: Related Resources

- Use of and references for the collection
  - Associated publications
  - Subcollections
  - Supercollections
  - Catalog or description
  - Cataloged status
  - Associated collections

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MetaArchive Conspectus: Harvesting Information

- Details about the web crawl that will gather the files into the ETD Dark Archive
  - Harvest Procedure: Web crawl or OAI harvest
  - Plugin Identifier: URI or URL
  - Extra Parameters: Archival Units, e.g., year = 2007
  - LOCKSS Manifest Page: permission to preserve
  - OAI provider
  - Risk Rank: designates the degree to which the collection is in jeopardy (5 choices from extreme to low risk)
  - Risk Factors: describe the reason this collection is endangered.

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MetaArchive and its Members: Roles and Responsibilities

Dr. Martin Halbert
President, MetaArchive Cooperative
Distributed Digital Preservation for ETDs Workshop
University of Pittsburgh
Pittsburgh, PA
Wednesday, June 10, 2009

Session Questions

- MetaArchive Charter and Membership Agreement
- Three types of membership that that are available
- Associated fees and responsibilities

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MetaArchive Charter, Membership Agreement , and Host Nonprofit

- Charter is a formative agreement that lays out the conceptual roles and responsibilities of participants
- Membership agreement is between new members and MetaArchive's administrative nonprofit corporation
  - Agreement to preserve content for specified period
  - Pledge to not intentionally harm the network

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Three Membership Levels

- Contributing Site Members: Do not run infrastructure, simply use the network to preserve content
- Preservation Site Members: Operate a MetaArchive network node for specified period, using it to preserve content
- Sustaining Site Members: Operate a node and participate in leadership of cooperative

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Associated Fees and Other Responsibilities

- Two Membership Levels:
  1. Preservation Site Members ($1,000/year): Ability to reposit content in the shared network infrastructure
  2. Sustaining Site Members ($5000/year): Above, plus seat on the Steering Committee and participation in directing the cooperative
- All members are obligated to provide and operate a minimal server on the network and accept at least as much content from others as they themselves reposit into the network
- 50 GB of network storage; adding content beyond specified base means adding incremental network storage fees of $2/GB per three year period
- Membership commitment is in three year increments
- Membership fees are reduced for members joining both NDLTD and MetaArchive simultaneously

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Individual Roles

- Program Managers are leaders that accept responsibility for coordinating the activities of a digital preservation network.
- Data Wranglers are programmers and other technically adept workers that prepare local digital archives for ingestion into a preservation network.
- System Administrators are staff members that maintain individual preservation node servers of the relevant preservation network.
- Selectors are staff that identify and prioritize content to be preserved. They will most often be knowledgeable concerning the content of an institution's digital archives, and may have been the same individuals that originally created or acquired the archives.

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Archive Ingest Process

- A “Plugin” is written for collections selected for preservation
- Plugins are programs describing rules and structure for the “archival unit”
- Either local staff or MetaArchive staff write these plugins and install them in the network
- At least 6 dispersed sites are selected for repositing the archival unit
- Caching process begins, with updates following if necessary

Requirements for Operating a Node

- Be able to bring up and maintain a Linux server over time
- Task local staff with both program management and systems administration duties, and preferably data wrangling as well
- Contribute content and monitor system functioning occasionally
- Sign membership agreement and pay membership dues

Meta Archive
COOPERATIVE

MetaArchive
A New Member's Perspective

Bill Donovan
Digital Imaging Librarian, ETD Administrator
Boston College

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Title: THE INFLUENCE OF EXPERIENTIAL GROUNDING ON ATTRIBUTIONS OF INITIAL TRUSTWORTHINESS AT WORK
Department: Carroll School of Management

Open Archival Information System

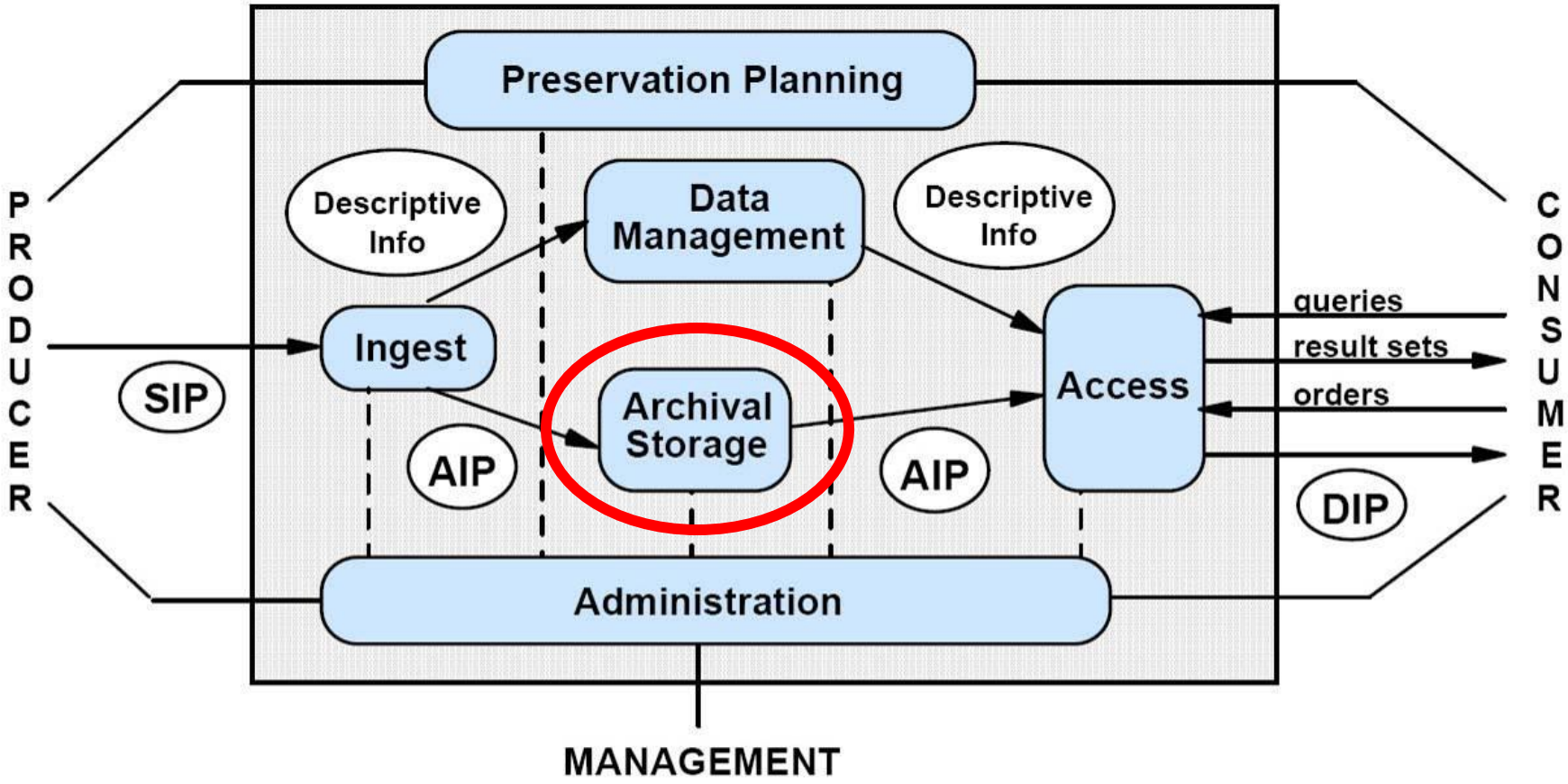
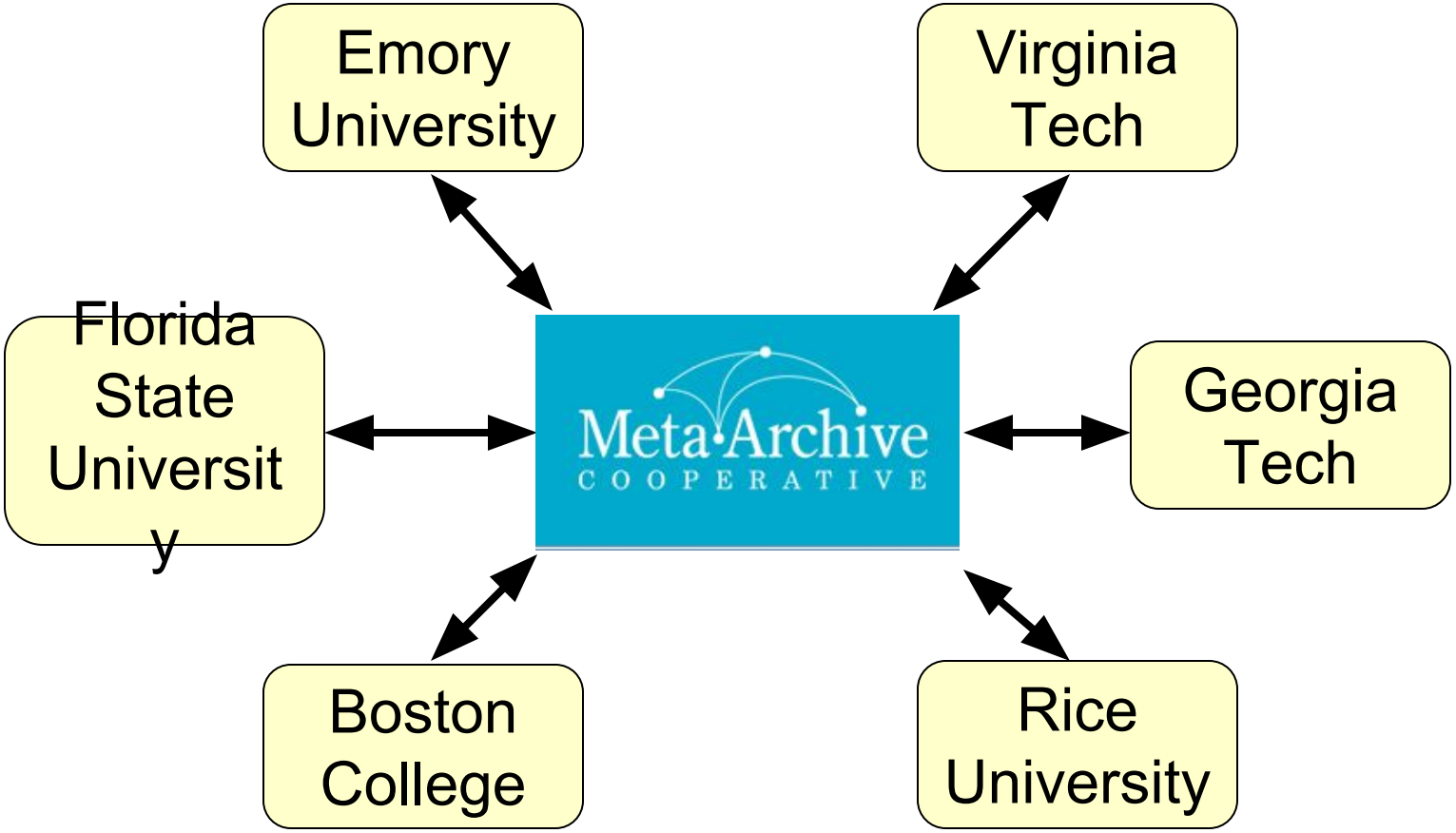


Figure 4-1: OAIS Functional Entities, adapted from: "Reference Model for an Open Archival Information System" CCSDS 650.0-B-1 (2002)

Distributed Digital Preservation



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PDF format becomes ISO standard

2008-07-02

The **Portable Document Format (PDF)**, undeniably one of the most commonly used formats for electronic documents, is now accessible as an ISO International Standard - ISO 32000-1. This move follows a decision by Adobe Systems Incorporated, original developer and copyright owner of the format, to relinquish control to ISO, who is now in charge of publishing the specifications for the current version (1.7) and for updating and developing future versions.

"By releasing the full PDF specification for ISO standardization, we are reinforcing our commitment to openness", says Kevin Lynch, Chief Technology Officer at Adobe. "As governments and organizations increasingly request open formats, maintenance of the PDF specification by an external and participatory organization will help continue to drive innovation and expand the rich PDF ecosystem that has evolved over the past 15 years."

PDF, a digital form used to represent electronic documents, allows users to exchange and view the documents easily and reliably, independent of the environments in which they are created, viewed and printed, while preserving their content and visual appearance.

With the explosive growth of the Internet, PDF has become one of the most common formats for document exchange, widely used in all professional and personal contexts. The format enables:

- preservation of document fidelity independent of device or platform
- merging of content from diverse sources
- collaborative editing of documents using multiple platforms
- digital signatures for authenticity
- security and permissions to preserve control over content
- accessibility of content to those with disabilities
- extraction and reuse of content for use with other file formats, and

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Related standards

- ISO 32000-1:2008
  Document management -- Portable document format -- Part 1: PDF 1.7

More standards »

Related information

- TC 171/SC 2 - Application issues

Preserving visual appearance

NISO Standards

Z39.87

Designation - Title	**ANSI/NISO Z39.87 - Data Dictionary - Technical Metadata for Digital Still Images**
Year	2006
Project Type	NISO Standard
Current State	Published
Abstract	This standard defines a set of metadata elements for raster digital images to enable users to develop, exchange, and interpret digital image files. The dictionary has been designed to facilitate interoperability between systems, services, and software as well as to support the long-term management of and continuing access to digital image collections. ANSI Approval Date: 12/18/06 Metadata for Images in XML Schema (MIX): http://www.loc.gov/standards/mix/ ISBN (10): 1-880124-67-X
ISBN	978-1-880124-67-3
Pagination	107
Final Document (PDF)	Z39-87-2006.pdf
Link To Buy	http://www.techstreet.com/cgi-bin/detail?product_id=1612226

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      framework as outlined by Allison and Zelikow in Essence of Decision, in order to understand the implementation patterns of the UN in regards to
      the Brahimi Report as reported and analyzed by the Henry L. Stimson Center. The findings of this report conclude that the UN is capable of
      change as demonstrated by its ability to comply with certain Brahimi Report recommendations, but is resistant to change, due to the structure of
      the organization. This does not mean, however, that it is fundamentally unable to do so. Attempts at reform must be able to circumvent these
      obstacles through targeted, direct action, for the Brahimi Report recommendations which received the highest implementation ratings were those
      incremental organizational reforms that targeted specific aspects of peacekeeping operations. Resistance to change within the UN, be it on behalf
      of individuals, departments, or Member States, is a huge obstacle to change, further compounding the obstacles to reform that the UN faces
      simply as an organization. Future reforms must thus be framed in a way that specifically grasps the attention of the groups/members involved in the
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FUNDAMENTAL FAILINGS: UNDERSTANDING THE UNITED NATIONS AS AN ORGANIZATION AND THE FUTURE OF UN PEACEKEEPING REFORM

by

Lauren K. Chang

Submitted in partial fulfillment

of graduation requirements for the degree of

Questions and Answers

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