DRM and the Repository

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Article begins on next page
DRM and the Repository

- DRM Starts with copyright ©

---But it doesn’t stop there

- Libraries have always mediated between copyright holders and end users for broad yet appropriate use

- Repositories are publishers, with the integrity of their resources to manage

- DRM is about seamless resource access, regardless of rights status
DRM and the Repository

Presentation Goals

- Suggest a DRM agenda for repositories
- Examine a data model for DRM in repositories
- Review the current legal and technical landscape of DRM
- Claim a place for repositories in an exciting, emerging area—DRM
DRM and the Repository

DRM Agenda for Repositories

- Restore copyright balance between rights holder and resource user (“society”)
- Support resource security; user privacy
- Integrate commercial and open access resources – the “one stop shop”
- Develop best practices for rights documentation
- Educate—the rights holder and the user
- Develop the “Phase 4” user-focused DRM System
DRM and the Repository

International Treaty

Regional law

National Law

License contract
DRM and the Repository

Berne Convention, Paris, 1971

- Amended 1979
- Foundation of International copyright
- Minimum enforceable standards to harmonize across member states. General term: life of creator plus 50
- Registration not required. Burden of proof rests with user/plaintiff
- Governance of copyright falls to country of origin (country of first publication)
- Moral rights (mutilation or distortion of work; harmful to reputation or honor of creator)
DRM and the Repository

WIPO Copyright Treaty (WCT), WIPO Performances and Phonograms Treaty (WPPT), Geneva 1996

- Bring copyright law into the digital age
- Provide legal protection and remedies against the circumvention of copyright information & technological protection measures that protect the exercise of author’s rights or restrict uses that are not authorized by authors or permitted under law.
- WCT provides protection for computer programs, compilations of data involving creativity.
- Reinstates the “Berne 3-Step test” for copyright exceptions
DRM and the Repository

WPPT

- Extends the rights of performers and phonogram producers for the exclusive disposition of their creative works: fixation, authorize broadcasting, public performance, commercial rental, performances available on demand.

- Gives producers exclusive right to distribute the original or copies of phonograms.

- Establishes the single equitable remuneration for use of commercial fixed performances and phonograms. Leaves division of remuneration between producers and performers to individual state to decide.
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Berne Three Step Test for Copyright Exceptions

1. Restricted to *special cases* rather than normal resource use

2. Must not conflict with *normal exploitation of the work*

3. Must not *unreasonably prejudice the legitimate interests of the author*

Examples: Fair use/fair dealing

Orphan works – unknown or unlocatable authors
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WIPO Treaty on the Protection of Broadcasting Organizations-- in Development

- Accepted public comment and decided in 2008 sufficient need to develop a treaty

- Object of protection – “program-carrying signal” itself, not the content.

- Rights include “retransmission” and “deferred transmission”

- Period of protection not currently defined.

- Maintains state’s right to enact exceptions, subject to the “Berne Three-Step Test”
Copyright Legislation Trends

Increasing governance via trade treaty and legislation:

-- TRIPS (WTO Agreement on Trade-Related Aspects of Intellectual Property Rights) – 1995

-- Australia/US Free Trade Agreement – extended Australia’s copyright protection to 70 years

Terms of protection range from Berne-required 50 years to 70. Unpublished works generally have longer protection than published.

UK “Publications Right” 25 years of rights to anyone publishing unpublished material that is no longer copyright protected.
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Other Rights Issues

Right of Publicity – Right to the commercial exploitation of the “persona” or the attributes that create identity

Underlying Rights

Copyright protection of the content may exist separately from the copyright of the fixed form (cinematographic work, broadcast, typographical edition)

Layered underlying rights. For musical track in a motion picture – sync rights and publishing rights
DRM and the Repository

DRM Data Model
DRM and the Repository

The Object

- **Availability** Resource can be obtained at any time by authorized users.

- **Integrity** “digital document must be whole and undisturbed”
DRM and the Repository

IDENTIFIER

- Globally Unique
- Actionable – Can associate with Metadata; Resolves to the resource, regardless of changes to location
- Unambiguous – know what is identified
- Consistently created and applied
- Scalable
- Interoperable
- Opaque vs. Intelligible?
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Standards-Based Identifier Strategy

- CNRI Handle http://handle.net"
- ARK Archival Resource Key – NOID Utility
  "http://www.cdlib.org/inside/diglib/ark/ "
- URI – Uniform Resource Identifier
  "http://www.ietf.org/rfc/rfc3986.txt”
- XRI eXtensible Resource Identifier
  “http://docs.oasis-open.org/xri/2.0/specs/xri-syntax-V2.0-cd-02.pdf”
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Maintaining Integrity of Resource

- **Digital Checksum**
  Unique “hash” based on the resource that, if changed, indicates a resource has changed (checksum)

- **Digital Signature / Digital Fingerprint**
  Cryptographic “key” used to encrypt a resource that requires either a shared private key or freely published public key to unencrypt. (digital signature or fingerprint)

- **Digital Timestamp**
  Adds time and referential integrity to checksum or other cryptographic hash
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Encryption for Resource Protection

₁ Scrambling the content and requiring a key to make it intelligible

₂ Symmetric or private key. Requires both parties to possess a private key

₃ Asymmetric or public/private key: Public key widely available. Private key known only to owner. Anyone may encrypt with public key, but private key required to decrypt

₄ PKI – infrastructure, requiring trusted third party, CA, to issue and revoke certificates that enable public and private key distribution.
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Checksum

Resource

Encrypted Resource – encrypted with public key

Private key used to decrypt resource
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Rights Metadata for Resource Should Provide:

- Rights status for the resource: copyright-protected, public domain, unknown

- Provenance – date of creation, creator; publisher, etc.

- Publication – status (published; unpublished; publication pending)

- Rights Holder: name; role; contact information; verification date

- Copyright notice; usage statement

- Durable link to deed of gift, license or permission
Workflow Management System for Digital Objects

Display Option | View Entries | Template | Clear All
--- | --- | --- | ---
Descriptive Metadata | Source Metadata | Technical Metadata | Rights Metadata
Metadata for transcript | Required Elements Only

Object Information

Collection:
Jazz Oral History Project
Project:
Jazz Oral History NEH Grant
Object Architecture:
Audio
File Name:
Template Used:
D1OH1PNH

Elements and Element Groups (descriptive)
- Type of Item
- Title or Name
- Identifier
- Language
- Genre
- Subject or Theme
- Abstract
- Table of Contents
- Physical Description
- Target Audience
- Note
- Person Name
- Business or Organization Name
- Origin Info
This object may be copyright protected. You may make use of this resource under a Creative Commons Attribution-Non-Commercial 2.5 license (see http://creativecommons.org/licenses/by-nc/2.5/). For any use not specifically declared under this license, please contact the rights holder for permission for further use. For evidence on attribution or citation:
## Rights Event

**Rights event entries for:** Event 1  [Existing event(s): 0]

<table>
<thead>
<tr>
<th>Type</th>
<th>Deed of gift</th>
</tr>
</thead>
<tbody>
<tr>
<td>Label</td>
<td>Deed of gift signed by Doc Cheatham</td>
</tr>
<tr>
<td>Place</td>
<td>New York, NY</td>
</tr>
<tr>
<td>Date &amp; Time</td>
<td>1985-11-04</td>
</tr>
<tr>
<td>Detail</td>
<td></td>
</tr>
</tbody>
</table>

### Associated Entity

<table>
<thead>
<tr>
<th>Role</th>
<th>Donor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Adolphus &quot;Doc&quot; Cheatham</td>
</tr>
<tr>
<td>Affiliation</td>
<td></td>
</tr>
<tr>
<td>Reference</td>
<td></td>
</tr>
<tr>
<td>Detail</td>
<td>Deed of gift signatory</td>
</tr>
</tbody>
</table>

### Associated Object

```
AssociatedEvent Entry List
```

**Add More**
In the digital space, almost everyone who uses the web is a creator.

Creators may not think of themselves as rights holders, and they may not think of others as rights holders.

Web creators rarely think of privacy implications.

Term of copyright is longer, for most works, than the term of commercial exploitation (e.g., 50, 70, 95 years).

Non-commercial creators are interested in impact, not $$$.

Maintaining a durable link between resource and creator is critical for future availability.
Tools for Enabling Creators to Continue Impact

Creative Commons licenses

-- Creative works, software applications, data

-- New metadata cc:REL; RDF-based schema; Supports XMP transmission

-- Web services enable repositories to offer CC licenses directly

www.creativecommons.org
Tools for Enabling Creators to Continue Impact

- SPARC  Resources for Authors / Author’s Addendum.
  http://www.arl.org/sparc/author/

- SHERPA/RoMEO Publisher Copyright Policies & Self-archiving database
  http://www.sherpa.ac.uk/romeo.php
Give the Gift of Understanding to Future Generations!

Postcard, 1890, American Labor Museum / Botto House National Landmark

Who are these ladies?

We wish we knew!

You and your family enjoy the photos and memorabilia you collect in scrapbooks, in photo albums, in boxes or files. Families like to remember grandparents and great grandparents. Everyone likes to remember holidays past and trips to the beach.
Deed of Gift
Photographs, Mementos and Family Documents

Date of Document (month) (day) (year)

This document is a deed of gift for the photographs, mementos, correspondence and family documents included in this container:

- Box
- Album or book
- File or folder

Container label: __________________________

Brief description of contents of container: __________________________

This document gifts to any interested cultural heritage information organization (library, museum, historical society, archive, etc) the following rights, as checked by me. Any right that is not checked is not provided:

- The right to own, preserve and make available by any means, including digital transmission, the original source materials (photographs, mementos, correspondence and documents) These materials may be used in any manner to further the educational and informational mission of the organization.

- A nonexclusive right to make the source materials in this container available for others to use through digitizing and sharing this information over the Web or by any other means of reproducing and sharing this information. The source materials may remain with my heirs, but permission to digitize and make available in any manner that furthers the educational and informational mission of the organization is granted.

Limitations to the deed of gift:

- Source materials may be digitized but may not be publicly displayed, distributed or shared until ___ years after the end of the year of my death.
- Full names and addresses of subjects in each photograph should not be provided in public display and distribution until ___ years after the end of the year of my death. First names and location at the city, county or state or country level may be provided.

I am the creator or owner of these source materials and have the right to dispose of them as I choose.

Signed __________________________
Name printed __________________________
Date of signature __________________________
DRM and the Repository

Topic Clergy
Topic Ordination

Temporal Contemporary America (1968-present)
Country UNITED STATES
  State New Jersey
  County Essex County
  City Newark (N.J.)
Title Remembering Newark's Greeks: An American Odyssey

Identifier (local) NPLRNG
Identifier (hdl) http://hdl.rutgers.edu/1782.3/NPLRNG.Photograph.3605

Physical Location (Newark Public NjN Librarymarcorg)

SOURCE Record

Availability Yes
Locator (Other) Object 2-B-12
Provenance Event ID PROV001
Provenance Event Type Exhibition
Provenance Event Label Remembering Newark's Greeks: An American Odyssey
Provenance Event Place Newark Public Library
Provenance Event Date Time 2002-10-21

Provenance Event Detail "Remember Newark's Greeks: An American Odyssey: A look at 100 years of the Greek Community in Newark, Photographs, Documents and Memorabilia, October 21, 2002 -December 31, 2002." Curated by Angelique Lampros and Peter Markos. Exhibit Committee Co-Chairs, assisted by Charles F. Cummings, Special Collections the Newark Public Library and City Historian.

Associated Entity ID ASSOCENTITY001
Associated Entity Name Angelique Lampros
The Resource User

- Authentication and Authorization practices that maintain user privacy; provide efficient access to resources
- Maintain confidentiality of resource use
- Enable reuse of resources through ability to contact creator/rights holder
- Use of DRM and Licenses are clearly exposed and understandable
Authentication: Who the user is

Authorization: What the user has the right to do

Authentication Factors

- What the user is or does (fingerprint; signature)
- What the user has (email account, smart card, OTP token)
- What the user knows (password)

All authentication should be at least two factor
Authentication and Authorization Strategies

- **OpenID** – web based authentication at OpenID-enabled websites on open web.

- **XACML** (eXtensible Access Control Markup Language) codify and enforce access policies for targets (resources, subjects (“users”) and actions

- **Shibboleth** – federated architecture for Authentication and Authorization
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XACML Request Process

Client

1. Makes request

2. Forms request

3. Sends Request

4. Forms Decision

5. Returns Decision

Policy Enforcement Point

Policy Information Point

Attributes (resource, environment, subject)

Policy Decision Point
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**Shibboleth Process**

**IdP**
- **SSO Handler**
- **Handle Service**
- **Authentication**
- **Attribute Query Handler**
- **ARPS**
- **Directory Service**

**SP**
- **WAYF**
- **Assertion Consumer Services**
- **Shibd**
- **Resource Manager**
- **Application**

1. Request
2. 
3. 
4. 
5. 
6. 
7. 
8. 
9. Access
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Digital Licenses

- ERMI (Digital Library Federation)
- ONIX-PL (publication licensing)
- PLUS Picture Licensing Universal System
- Enabling technology: XMP (Extensible Metadata Platform)

License For VS. License
DRM and the Repository

Embedded Licenses

- Can provide micro licensing for individual resources or components
- Can support usage control and tracking
- Will change library acquisition and resource management workflow
- Need to be transparent to user—legal contract
## DRM Systems – 3 Stages of Development

<table>
<thead>
<tr>
<th>Stage One</th>
<th>Stage Two</th>
<th>Stage Three</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Enclosed</strong></td>
<td><strong>Modular</strong></td>
<td><strong>Global</strong></td>
</tr>
</tbody>
</table>

**Stage One**
- “Trusted System”
- Tethered to device
- Hidden from user
- Examples:
  - WMDRM
  - FairPlay
  - CPSA

**Stage Two**
- Flexible Implementation
- Enables modular use of DRM services
- Interoperable
- Examples:
  - OMA DRM 2.0
  - MPEG IPMP

**Stage Three**
- Interoperable
- Supports multiple business models
- Supports “community of trust” definition and use
- Examples:
  - Coral Consortium
  - Project DReaM (Sun)
Phase I DRM Transaction
DRM and the Repository

Enabling Technology – The Watermark

“Pseudo-noise” embedded in area imperceptible to user but detectable with software

Contains copyright and provenance information, copy control information

Qualities:

- Robust
- Imperceptible (unless intentionally visible)
- Reversible
- Secure

Often compromised through “collusion”
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CPSA – Content Protection Systems Architecture

Content protection framework that uses copy control information, watermarks and encryption to protect content at source, transmission and receiving or sink device

Particularly used for broadcast to set tops, DVD and Blu-ray optical media

Requires enabled devices

Renewable protection; can revoke certificates of infringing devices
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CMSA Technologies

CSS – Content Scrambling Systems – DVD
openly compromised

CGMS – Copy Generation Management System.

CGMS-A plugs “analog hole” NTSC line 20 or 21, recognized by most digital camcorders and some video capture cards

CPRM – Content Protection for Recordable Media (DVD-R/RW)

AACS – Advanced Access Content System – Blu-ray encryption. Already compromised

HDCP (High-bandwidth Digital Content Protection), DTCP (Digital Transmission Content Protection) and DTCP-IP – Encrypted transmission for interfaces (DVI, Firewire, etc.)
Coral Architecture

Ecosystem Specifications

Coral Domain Architecture

DRM System 1

... DRM System N

Coral Core Architecture

Coral Trusted Communications Layer

Lower-Level Networking Specifications

License derivation using standardized rights tokens
DRM and the Repository

Sun Microsystems’ Project DReaM

CAS (Conditional Access System) – “DRM Lite” using standardized components

MMI (“Mother May I”) clients negotiate for rights from a range of DRM systems using standardized protocols.
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MMI for U.S. Fair Use Scenario

User

Anonymizing agent

Request from “Student of Univ X”

Resource Provider

Use not as described

Forensic watermark

Fair use purpose form; Disclosure agreement
Phase IV: “OpenPeople” Design

AA Directory

Opt in

Rights Holder

Resource

XRI identifier – LDAP compliant, or could use cross-reference

Results
Shameless

Chandos Press, July 2008