Digital Forensics, Archival Science, and New Media Art

Where Art Met Science or
The Search For Intent

DFRWS 2015: August 12, 2015
Dianne Dietrich Cornell University
Frank Adelstein Cayuga Networks
Introduction

• Frank
  – Background: Forensic R&D, Tools, Training, etc.
  – Interest in applying forensics to archival material (hey, this doesn’t involve crime!)
  – Joint paper to understand commonalities and points of divergence between two areas
Introduction

• Dianne
  – Technical lead on grant at Cornell University Library:
    • Analyze a collection of CD-ROM art from the ‘90s
    • Characterize it in enough detail to develop framework for access and preservation framework other institutions could use for similar collections
  – Parallels to forensics:
    • We too had incomplete information (about the artworks)
    • Couldn’t always get in touch with their creators and didn’t always know “exactly how” something should work
Preservation and Access Framework for Digital Art Objects

Test bed: 100 born-digital artworks created for CD-ROM, 1990s-2000s

Includes: Standalone executable files, installed software, 3D landscapes, works run entirely in web browsers, etc.
"I am worried about context and artistic intent – how do we retain authenticity in the long term?"

"Access to past works are incredibly valuable to me – understanding works not just for their message but also for their technical [aspects that] help new media artist[s] evolve [this] area of practice."
New media art is on obsolete hardware

“Macintosh System 7.0 and up”
“Internet connection and web browser with … Shockwave”
“PowerPC processor-based Macintosh computer”
“Macintosh with 680x0 series processor”
“16 bit color and 13 inch monitor”
“QuickTime 2.1 or better”
New media art is on obsolete hardware

“Windows 95”
“IBM-compatible PC”
“MPC2, 486, or Pentium PC”
“Requires Internet Explorer 5.5, DirectX”
“SVGA video card”
“SoundBlaster compatible sound card”
“Flash player 8 or higher”
Example 1: Beyond Manzanar

- Immersive environment based on the Japanese-American internment camp at Manzanar
- Semi-transparent and fading images integral to the overall experience

- Needed to optimize graphics rendering in emulated environment
- Analysis needed to confirm we provided the best possible version of the experience
Analysis clarifies limits of access
Analysis clarifies limits of access

Beyond Manzanar (2002)
Tamiko Thiel and Zara Houshmand
May the mountains witness.

Williamson, Whitney, Lone Pine, look:

To the West, a sea of strangers.

Each one wears my face.

Erase the shame, the fear, the witless hate,

Witness now, too late:

Each stranger wears my fate.
May the mountains witness.
Williamson, Whitney, Lone Ponder
To the West, a sea of
Each one wears my face:
Erase the shame, the fear,
Witness now, too late:
Each stranger wears

Let the earth feel:
To the East, a friend unfound yet.
Embrace the lover yet to be discovered.
unmake the bed you’ve made; go free.
How like you is the other: simply see.

Beyond Manzanar (2002)
Tamiko Thiel and Zara Houshmand
Analysis clarifies limits of access

May the mountains witness.
Williamson, Whitney, Lone Peak

To the West, a sea of sand.
Each one wears my face.

Let the earth feel:

Erase the shame, the fear, the
witness now, too late:

Embrace the lover yet to be discovered.

Unmake the bed you've made; go free.
Example 2: Just from Cynthia

- Compilation of multiple works on a single CD-ROM
- Many mysteriously named files – seemingly unrelated to the actual artworks – present on disc
- File system metadata was insufficient to determine the purpose of the mystery files
- Running the work in an emulated system was required to understand their purpose
### File metadata can’t tell the whole story

```
bcadmin@ubuntu:/media/sdb1/datadrive/metadata_samples/tech_metadata$ hls -lbQ
f  ????/????  1694  0 Mar 19 1997  "\t\t\t\t\t\t\t\t\t"
f  ????/????  1694  0 Mar 19 1997  "\t\t\t\t\t\t\t\t\t"
f  ????/????  1694  0 Mar 19 1997  "\t\t\t\t\t\t\t\t\t"
f  ????/????  1694  0 Mar 19 1997  "\t\t\t\t\t\t\t\t\t"
f  ????/????  1694  0 Mar 19 1997  "\t\t\t\t\t\t\t\t\t"
f  ????/????  1694  0 Mar 19 1997  "\t\t\t\t\t\t\t\t\t"
f  ????/????  1694  0 Mar 19 1997  "\t\t\t\t\t\t\t\t\t"
f  ????/????  1694  0 Mar 19 1997  "\t\t\t\t\t\t\t\t\t"
f  ????/????  1694  0 Mar 19 1997  "\t\t\t\t\t\t\t\t\t"
f  ????/????  1694  0 Mar 19 1997  "\t\t\t\t\t\t\t\t\t"
f  ????/????  1694  0 Mar 19 1997  "\t\t\t\t\t\t\t\t\t"
f  ????/????  1694  0 Mar 19 1997  "\t\t\t\t\t\t\t\t\t"
f  ????/????  1694  0 Mar 19 1997  "\t\t\t\t\t\t\t\t\t"
```

---

Just from Cynthia (2001)

Albert Sorbelli
File metadata can’t tell the whole story

Just from Cynthia (2001)
Albert Sorbelli
File metadata can’t tell the whole story

<table>
<thead>
<tr>
<th>Name</th>
<th>Date Modified</th>
<th>Size</th>
<th>Kind</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wed, Mar 19, 1997, 4:55 PM</td>
<td>10K</td>
<td>document</td>
</tr>
<tr>
<td></td>
<td>Wed, Mar 19, 1997, 4:55 PM</td>
<td>10K</td>
<td>document</td>
</tr>
<tr>
<td></td>
<td>Wed, Mar 19, 1997, 4:55 PM</td>
<td>10K</td>
<td>document</td>
</tr>
<tr>
<td></td>
<td>Wed, Mar 19, 1997, 4:55 PM</td>
<td>10K</td>
<td>document</td>
</tr>
<tr>
<td></td>
<td>Wed, Mar 19, 1997, 4:55 PM</td>
<td>10K</td>
<td>document</td>
</tr>
<tr>
<td></td>
<td>Wed, Mar 19, 1997, 4:55 PM</td>
<td>10K</td>
<td>document</td>
</tr>
<tr>
<td></td>
<td>Wed, Mar 19, 1997, 4:55 PM</td>
<td>10K</td>
<td>document</td>
</tr>
<tr>
<td></td>
<td>Wed, Mar 19, 1997, 4:55 PM</td>
<td>10K</td>
<td>document</td>
</tr>
<tr>
<td></td>
<td>Wed, Mar 19, 1997, 4:55 PM</td>
<td>10K</td>
<td>document</td>
</tr>
</tbody>
</table>

Just from Cynthia (2001)
Albert Sorbelli
Wrap up

• Intent
  – Sometimes archivists must alter data to preserve the significant properties of digital material

• The Past
  – Obsolete technology needs obsolete tools and arcane knowledge. Don’t lose it or assume it’s no longer valuable!

• The Future
  – Scary words: cloud, mobile, ephemeral, distributed, ocean of data
  – How can highly interconnected, massive, moving data be frozen?
  – Emulation and virtualization are still imperfect access strategies

• Preserving data long term
  – “There is no preservation without loss.” – Matthew Kirschenbaum
### Image credits (in order of appearance)

- “Welcome to Macintosh” Screen capture of System 7 in BasiliskII emulator (Dianne Dietrich)
- **Just from Cynthia** by Albert Sorbelli: File listings in Ubuntu and Mac OS 8 (Dianne Dietrich)
Thank you to the PAFDAO team and advisory board

**Grant PIs:** Oya Rieger, Timothy Murray

**Cornell PAFDAO Team:**
Desiree Alexander, Madeleine Casad, Dianne Dietrich, Jason Kovari, Danielle Mericle, Liz Muller, Michelle Paolillo

**Consultants at AVPreserve:** Alex Duryee, Chris Lacinak, Kara VanMalssen

**Advisory Board:** Ben Fino-Radin, Jean Gagnon, Rebecca Guenther, Matthew Kirschenbaum, Jon Ippolito, Norie Neumark, Christiane Paul, Richard Rinehart, Simeon Warner

This work supported by a grant from the National Endowment for the Humanities

Any views, findings, conclusions, or recommendations expressed in this presentation do not necessarily represent those of the National Endowment for the Humanities.