

Project Narrative

Imminent Risks for New Media Art

Although the collections of interactive digital artworks on CD-ROM, DVD-ROM, and the Internet are arguably among the most unique and most significant of the Goldsen's holdings, they are currently among the least accessible to national researchers, and they face a variety of imminent risks. Interactive digital assets are far more complex to preserve and manage than single, uniform digital media files; a single interactive "work" can comprise an entire range of digital objects, including files in different types and formats, applications to coordinate the files, and operating systems to run the applications. Every part of these complex systems faces the risk of degradation and technological obsolescence, and this risk is not uniform, even within a single title. If any part of this complex system fails, the entire asset can become unreadable.

Because of the fragility of storage media like optical discs, physical damage is also a serious danger for the Goldsen's artworks on CD-ROM and DVD-ROM, many of which are irreplaceable. Even migrating the information files to another storage medium is not enough to preserve their most important cultural content. About 70 percent of CD-ROM artworks in the Goldsen collection already cannot be accessed without a specialized computer terminal that runs obsolete software and operating systems. The majority of artistic CD-ROMs created between 1992 and 2004 were developed to run on Apple computers and the Mac OS 9 operating system. Apple's 2006 switch from Motorola/PowerPC to Intel rendered the company's new computers incompatible with binary software applications written for its earlier models.

For an example of an interactive artwork in the Goldsen's collection, please consider the CD-ROM artwork *Fantastic Prayers* (2000), a collaboration between Tony Oursler, Constance DeJong, and Stephen Vitiello. *Fantastic Prayers* is a CD-ROM version of the Dia Foundation's first artists' project for the web. The CD-ROM artwork consists of varied, complex, and overlapping aesthetic experiences: sound recordings of music and dramatic monologues, digital paintings, short video clips, densely layered audiovisual essays that the user navigates and explores with the clicks and movements of a computer mouse. Expansive and complex, the artwork includes many sections, each with its own distinct aesthetic, expressed through rich sound and video quality and intuitive but non-standard modes of interactivity.

Because so much of new media works' cultural meaning derives from their responsiveness to spontaneous input — and the user's direct, unrepeatable experience of this interaction — these technological threats pose serious challenges to the Goldsen's collections.

Related Studies in Preservation Practice

Libraries, museums, and archives have been collecting and caring for complex born-digital materials for several decades. These institutions have been struggling to find ways to provide long-term access to content that is dependent on a number of technologies, including processors, operating systems, software, file systems, storage media, network interfaces, and file formats, some or all of which may have become obsolete. Recent research and development projects are investigating viable, sustainable strategies for preserving complex born-digital content. Strategies range from capturing digital collections using digital forensic tools, to supporting scholarly research by preserving the user experience of interactive works through video documentation.

Some recent examples that have informed CUL's proposal include:

The December 2010 report, "Digital Forensics and Born-Digital Content in Cultural Heritage Collections," published by CLIR, analyzes in detail the tools of the digital forensics community, and offers step-by-step guidance for archivists who want to use these same tools to clone or make a forensic image of the device. Stanford University Libraries and the Bodleian Libraries currently apply these methods to collections contained on obsolete storage media.[2]#_ftn2]

CUL's proposed project begins with a thorough analysis of data structures, risks, and dependencies across our extensive test group, and this preliminary technical analysis will be informed by digital forensics initiatives. Matthew Kirschenbaum, the co-PI of the Digital Forensics Initiative, will be a member of the proposed project's advisory group and will guide us in building on the findings of the study. Our goal is to automate this data analysis and to focus it around practical, large-scale requirements for preserving access to digital assets.

Since 1999, arts archiving institutions have worked to develop archival frameworks that address the complexity and particular preservation challenges of complex, interactive artworks. Some of the most successful frameworks have come from Variable Media Initiative (VMI, a project undertaken by the Guggenheim Museum and the Daniel Langlois Foundation),[3]#_ftn3] and the related international research alliance Documentation and Conservation of the Media Arts Heritage (DOCAM).[4]#_ftn4] DOCAM has produced cataloging and preservation guides for complex media art objects; VMI collaboratively authored the Variable Media Questionnaire, an archiving tool that emphasizes behavioral and ephemeral aspects of interactive artworks. Another important archival model has been that of "scoring" interactive media experiences as they unfold in time.[5]#_ftn5]

These frameworks focus on the ephemeral, experiential aspects of interactive art and emphasize descriptive metadata in their archival methodology, often with less consideration for the necessary technical metadata. While descriptive metadata is unquestionably an essential part of any preservation framework, CUL's project builds technical data models to support a more robust preservation model, while integrating existing efforts in descriptive data. Advisory Board members Gagnon, Paul, and Rinehart are original PIs of the VMI and DOCAM groups, and they will help guide our efforts in this area.

In Europe, the Keeping Emulation Environments Portable (KEEP 2009-2012) project developed "flexible tools for accessing, manipulating and storing a wide range of digital objects using emulation tools." KEEP also released a metadata model about the technical environment required to access and manipulate complex digital objects.[6]#_ftn6] A KEEP-affiliated project at the University of Freiburg in Germany, the Baden-Wuerttemberg Functional Longterm Archiving and Access project (bwFLA), is working on practical workflows to support preservation of digital assets through emulation[7]#_ftn7].

For CUL's purposes, emulation technology is not yet a viable or reliable preservation strategy for most digital assets. In a 2010 report, the team of the Preserving Virtual Worlds project reports that the project's "research on emulation in particular shows that significant visual and aural aspects of the work can be strongly affected by running under emulation." [8]#_ftn8] Because alterations to the visual and aural aspects of a digital artwork could change the artwork's apparent message or meaning, we are acutely aware of the continued need for metadata models to bridge the gap between technical limits on full rendering and the need for quality preservation. We are in communication with bwFLA and will track the developments of this ongoing project with interest.

The net.artdatabase initiative documents user interaction with obsolete computing environments through a simultaneous display of a video of the user interacting with a work on a desktop computer and a screen capture of the interaction.[9]#_ftn9] This project may inform CUL's access version as described in the Year 2 methodology.

The Preserving Virtual Worlds Project has developed and tested imaging technologies, emulation strategies, metadata models to document complex dependencies, and methods for packaging complex objects and associated metadata.^{[10]#ftn10} Although team members made good progress, they also explain that much work still needs to be done to fully implement a long-term preservation plan for complex objects. They recommend that, as a follow-up initiative, libraries and archives develop packaging standards for ingest of gaming materials into digital repositories that explicitly include support for application of standard data models. The goal is to insure that the identification of materials and links between them are sufficiently precise and detailed to support preservation activity.

The Goldsen Archive stands poised to develop the findings of these excellent R&D efforts. Now, the critical need is for preservation workflows to be tested and implemented, *with actual collections*, and at scale. Within this context of existing and ongoing research and development initiatives, CUL's project will provide the following necessary advances and refinements:

1. Submission Information Packages (SIPs) that document dependencies through comprehensive representation information, and define and capture significant properties of interactive works, so that packages can be ingested into a preservation repository.
2. Identification of Significant Properties needed to provide for the long-term preservation and access of new media objects.
3. Defining a Metadata Framework to support capture of technical and descriptive information to support long-term preservation and potential reuse. This metadata framework must facilitate large-scale ingest and acknowledge the frontiers of emulation technology, but also accept the limitations of current access technology and allow for adequate descriptive metadata to provide the best viable access to interactive artworks according to users' needs.
4. Testing Large-Scale Implementation and Automation to expand the test bed to include several hundred interactive digital assets as the aforementioned studies generally focused on a few in-depth case studies. CUL also will explore resource requirements, including staff skills, special equipment needs, and associated costs.
5. Understanding and Assessing Preservation Viability for Interactive Digital Assets to contribute to a more refined understanding of "preservation viability" for complex digital assets into the near future. As an additional contribution to this improved understanding, CUL will publish a full report of the project, including financial information, so that other institutions may accurately assess the practicality of such an undertaking for their own collections.

CUL's preservation framework and reports will contribute to better and more practical understanding, management, and curation of digital assets. Our project adds large-scale pragmatism, technological foresight, and humanistic nuance to existing initiatives. We hope to develop a sharable and flexible preservation framework for new media art and complex digital objects. This framework will become increasingly important as digital media objects gain broad recognition as some of the most significant documents and expressions of recent cultural heritage.

[1]#_ftnref1] Earlier initiatives at the Walker Museum of Art, the Whitney Museum of Art, the Museum of Modern Art, the San Francisco Museum of Art and the Berkeley Art Museum have been inconsistent and targeted around the profile of a limited number of the most marketable artists.

[2]#_ftnref2] See Kirschenbaum, Matthew G., et al, "Digital Forensics and Born-Digital Content in Cultural Heritage Collections," available at: <http://www.clir.org/pubs/reports/pub149>

[3]#_ftnref3] See project description and interactive demonstrations at:

<http://www.guggenheim.org/new-york/collections/conservation/conservation-projects/variable-media>

[4]#_ftnref4] See project description and publications at: <http://www.docam.ca/>

[5]#_ftnref5] See Rinehart, Richard, "A System of Formal Notation for Scoring Works of Digital and Variable Media Art," available at <http://www.bampfa.berkeley.edu/about/formalnotation.pdf>

[6]#_ftnref6] For further information, including reports from the first and second years of the project, see the KEEP website at: <http://keep-project.edu>

[7]#_ftnref7] See bwFLA website, <http://bw-fla.uni-freiburg.de>

[8]#_ftnref8] McDonough, Jerome P., et al, "Preserving Virtual Worlds Final Report" (2010), available at www.ideals.illinois.edu/handle/2141/17097 pg. 6.

[9]#_ftnref9] See online database and information at <http://net.artdatabase.org>

[10]#_ftnref10] McDonough et al, "Preserving Virtual Worlds Final Report" (2010), pg. 7.