



NATIONAL ENDOWMENT FOR THE

Humanities

DIVISION OF PRESERVATION AND ACCESS

Narrative Section of a Successful Application

The attached document contains the grant narrative and selected portions of a previously funded grant application. It is not intended to serve as a model, but to give you a sense of how a successful application may be crafted. Every successful application is different, and each applicant is urged to prepare a proposal that reflects its unique project and aspirations. Prospective applicants should consult the Division of Preservation and Access application guidelines at <http://www.neh.gov/grants/preservation/preservation-and-access-research-and-development> for instructions. Applicants are also strongly encouraged to consult with the NEH Division of Preservation and Access staff well before a grant deadline.

Note: The attachment only contains the grant narrative and selected portions, not the entire funded application. In addition, certain portions may have been redacted to protect the privacy interests of an individual and/or to protect confidential commercial and financial information and/or to protect copyrighted materials.

Project Title: Preservation & Access Framework for Digital Art Objects

Institution: Cornell University

Project Director: Oya Y. Rieger

Grant Program: Preservation and Access Research and Development

3. NARRATIVE

A. SIGNIFICANCE

Preservation & Access Framework for Digital Art Objects will help cultural and educational institutions broaden and sustain community access to an increasingly significant, yet challenging area of our cultural heritage. It will promote interdisciplinary learning, teaching, research, and cultural practice across the fields of art, art history, information science, comparative literature, media culture, visual studies, performing arts, anthropology, and digital humanities. The preservation model developed will apply not merely to new media artworks, but to other rich digital media environments.

The Rose Goldsen Archive of New Media Art (<http://goldsen.library.cornell.edu>) is one of the nation's most extensive and accessible collections of media artworks. Housed in Cornell University Library's Division of Rare and Manuscript Collections, the Goldsen benefits from CUL's long history with digital archiving technologies. Its collections and institutional position make the Goldsen an ideal test bed for the development and implementation of new digital preservation efforts and the broad dissemination of project results.

The Goldsen Archive emphasizes video art, interactive digital interfaces, and artistic experimentation by international, independent artists. Its collections chart the history of aesthetic experimentation with electronic media.

For the proposed project, we will focus on a large target art group of interactive digital works for CD-ROM, DVD-ROM, and the Internet. These works were created for exhibition on small-screen monitors in both private and public spaces. The project's significance stems from the important contribution it will make to the development of preservation practices for complex digital assets, as well as the extraordinary cultural value of the artworks in our target group.

Media Art and Cultural History

The CD-ROM, DVD-ROM, and Internet artworks in our test group document key aesthetic and technological developments across two particularly transformative decades of media art history. Since 1991, the world has witnessed a prolific development of interactive artworks designed for access on personal computers.

The Goldsen's interactive digital holdings enhance the world's understanding of a significant set of influential artists and their oeuvre. These collections chart the transformation of artistic practices across the two most crucial decades of the digital revolution, an historical shift in emphasis within media culture from analog to disc-based to networked and Web-based applications. The vast majority of the Goldsen's digital artworks engage or interrogate the terms of this transformation. In addition to providing an important collection of national and international art history, the Goldsen Archive constitutes a vital record of our cultural and aesthetic history as a *digital* society. In the coming years, historical collections of interactive, born-digital assets like those in the Goldsen Archive will become increasingly valuable for study, appreciation, and understanding of digital cultural history.

During the first decade of this development, leading contemporary artists with prior emphasis on video art, conceptual art, and multimedia sculpture (artists such as Muntadas, Ann Hamilton, Lynn Hershman, Michael Snow, Takahiko Iimura, Chantal Akerman, and Janet Cardiff), began developing projects for small computer screens. A new generation of electronic artists began to test the scope, range, and interactive audiovisual capability of the new storage media of CD-ROM and eventually DVD-ROM. These experiments launched the careers of today's most influential new media artists, including Zoe Beloff, Art Jones, Adriene Jenik, Lev Manovich, George LeGrady, Jody Zellen, Jennifer and Kevin McCoy, Annette Barbier, and Christine Tamblyn. The rapid development of open computer networks

helped launch or sustain the careers of other influential and “digitally born” artists who focused on interactive artworks made for the Internet, such as Natalie Bookchin, Shu Lea Cheang, Marina Zurkow, Diane Ludin, Mez, and Simon Biggs. Many of these artists worked on CD-ROM and Internet platforms as well as larger-scale installations; their small-screen interactive works contributed to the international prestige of interactive artwork and its impact on digitally inflected painting, sculpture, photography, and video.

The Goldsen Archive constitutes a world-class research collection of work by these leading artists. The digital works in our test group include new artworks created for the personal computer, interactive small-screen adaptations of larger museum-based artworks, and also numerous interactive research compendia focused on prominent artists such as Thierry Kuntzel, Michael Snow, and Stelarc. In addition to interactive applications, the collection incorporates documents, digital ephemera, interviews, and video and photographic documentation of installations and performances. Also represented are documentation and works from collective digital workshops, and a vast collection from digital artists who developed networked presences rather than museum and gallery prestige. The Goldsen is the only American *onsite-accessible* research collection of this work that continues to collect and preserve on an active basis.¹

Educational Use and Public Programming

A wide range of audiences explore the Goldsen, which supports on-site access to all of its holdings in keeping with CUL’s archival mission. The Goldsen Archive is cataloged and accessible via the library’s online catalog and the WorldCat global catalog. The archive’s website includes guides and collection descriptions to facilitate discovery of materials by potential users. By registering with the Division of Rare and Manuscript Collections at Cornell University Library, any person may gain access to the Goldsen’s materials. The Division staff are actively involved in Cornell courses, teaching nearly 200 classes on the collections per year, including Goldsen materials. The Goldsen Archive is regularly visited by academic researchers, media and technology scholars, and artists. Goldsen materials are used by students and faculty in courses being taught and developed in Theatre, Film and Dance; History of Art and Visual Studies; Comparative Literature (for the undergrad major track in “Literary, Visual, and Media Studies”); Art & Architecture; Music; and American Studies.

The Goldsen Archive has also conducted a number of public programming initiatives; notably, the touring exhibition “Contact Zones: The Art of the CD-ROM” (<https://contactzones.cit.cornell.edu/index.html>) highlights the collection. Its disc- and Web-based artworks are used in visual studies and media classes at Cornell University, Ithaca College, and beyond.

Lastly, the Goldsen Archive sponsors an annual research grant for scholars to visit the Cornell campus and work with its collections. It attracts international doctoral students, artists, curators, and academics to consult its holdings, and it regularly brings nationally and internationally renowned artists and scholars to the Cornell University campus for public symposia and conferences that focus on its collections.

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

¹ 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.

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

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

² 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>

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 finding 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 and the related international research alliance Documentation and Conservation of the Media Arts Heritage (DOCAM).⁴ 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

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 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 emulation⁷.

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 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.

³See project description and interactive demonstrations at:

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

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

⁵See 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>

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

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

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

- 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 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 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.

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

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

B. BACKGROUND OF APPLICANT

About Cornell University Library

Cornell University Library (CUL) stands at the center of intellectual life at the university, fostering connections and knowledge that help students, teachers, and researchers from around the world excel in research and scholarship. Ranked among the top 10 academic research libraries in the country, the Library supports and enhances teaching and research through its extensive collections, cutting-edge services and facilities, and a deep network of digital resources. The Library holds more than 7.8 million print volumes, more than 650,000 ebooks and more than 100,000 current serial titles. Additionally, the Library's extensive archives hold nearly 78,000 feet of archival and manuscript materials, which are cared for and made accessible with help from the Library's in-house preservation and conservation team.

CUL is a leader in providing enduring access to digital content, with a digitization program that began in 1995. The library staff has been involved in many research, education, and program development efforts in order to create a strong archival infrastructure for the library's rapidly growing digital collections. In addition to the streamlined preservation and digital curation, R&D projects allow the library staff to explore a range of technical and managerial issues.

Through an NEH/IMLS Advancing Knowledge Digital Partnership Grants from 2009 to 2011, CUL collaborated with Ithaka S+R and Portico in exploring a range of preservation issues for digital books. Although the research study focused on digital books, it provided a practical model for the preservation of all types of digital content, including establishing a managerial and technological infrastructure.

Understanding and documenting preservation costs is a primary focus of CUL's work. At the heart of its archival strategy is a Fedora-based digital repository with associated digital preservation policies. To ensure a persistent, long life for digital data, information stewardship organizations running heterogeneous, geographically dispersed digital preservation repositories must be able to exchange copies of archived information with each other; to this end, from 2008 to 2010, CUL collaborated with the Florida Center for Library Automation and New York University Libraries to develop a proof of concept for the exchange of information between digital preservation repositories. The project aimed to develop practical repository-to-repository transfer protocols to support transporting rich preservation metadata and associated digital objects.

The Goldsen Archive, Cornell University Library

The Goldsen Archive maintains extensive holdings in interactive digital media, and benefits from multifaceted support from its institutional home within the Division of Rare and Manuscripts. It has a long collaboration with CUL's department of Digital Scholarship and Preservation Services; more than a decade of experience with digital media preservation and rights management; and a deep, demonstrated commitment to promoting public access and understanding of complex media artifacts.

In addition to the CD-ROM, DVD-ROM, and Internet holdings discussed in the previous section, the Goldsen Archive's collections include national and international holdings in video, electronic sound art, and significant paper and print collections that chronicle the history of media art both nationally and worldwide. The Goldsen Archive serves as the repository of an annual competition funded by the Rockefeller Foundation in New Media Art, a collection that includes the writings and artworks of many of the United States' most prominent media artists. The Goldsen Archive is the repository of the video art collection of the Experimental Television Center (ETC), one of the earliest and most influential U.S. centers for video art production, via a grant from the New York State Council of the Arts (NYSCA). The New York Council of the Arts selected the Goldsen as the repository for the archives of its Electronic Media and the Arts Program, which is historically the nation's most significant state funding source for electronic arts.

These collections position the Goldsen as the United States' leading research collection of American new media and video art, and they are supplemented by the country's largest collections of Chinese and Taiwanese electronic art, significant holdings from Australia and Europe, as well as a current collaboration to serve as the repository of extensive historical collections of video and new media art created in Cyprus.¹¹

It hosts the international new media art email listserv, *—empyre—soft_skinned_space*, and frequently partners with Cornell's Society for the Humanities and the School of Criticism and Theory in initiatives for the digital humanities and digital culture. The Goldsen is recognized as one of six international digital art archives dedicated to Preservation and Documentation Strategies, along with Ars Electronica, Tate Intermedia, FACT, computerfinearts.com (which has its repository in Goldsen), and Rhizome Artbase.¹²

Goldsen's representatives were among the initial participants in the DOCAM (Documentation and Conservation of the Media Arts) research alliance. They are often featured presenters and invited participants at conferences and workshops on archiving new media, speaking to key topics such as documentation, preservation, and rights management.¹³ Most recently, the Goldsen's representatives participated in a workshop on "Cataloging Digital Objects" at the Museum of the Moving Image¹⁴ and gave featured presentations on curating, archiving, and preserving new media at the major international conferences ISEA 2011 and Fundacio Telefonica 2010.¹⁵

The Goldsen Archive is also at the forefront of developing progressive rights arrangements with donors for provisioning for preservation of the collection. Standard verbiage gives CUL to the right to copy, migrate, or digitize all or part of donated/purchased collections for preservation, access, and educational purposes internal to the Goldsen Archive or for the purposes of advancing Cornell's teaching mission.

Our experience has convinced us that the growing community of digital media archives needs a forward-thinking preservation model that incorporates specific and practical technical standards and processes. With a deep collection of interactive digital material and the invaluable institutional and technical support of CUL's Digital Scholarship and Preservation Services, the Goldsen Archive uniquely positioned to pursue this.

Digital Scholarship & Preservation Services, Cornell University Library

The Cornell University Library's Digital Scholarship & Preservation Services program facilitates collaborations within the Cornell community in the creation and management of digital scholarly content and tools to support learning, teaching, and research. The unit provides services in support of digital collections, subject and institutional repositories, and scholarly communication with a focus on needs assessment, policy development, user support, preservation, and business planning. It is the headquarters for the Digital Consulting and Production Services, which is a virtual group composed of digitization,

¹¹ More information about this collection and the non-governmental organization that assembled it are available at: <http://www.neme.org/>

¹² See <http://paulhertz.net/research/digarthistdb.html>

¹³ <http://www.mediaarthistory.org/>The Goldsen is a signatory of the International Declaration, "Media Art Needs Global Networked Organisation and Support", sponsored by Media Art History.org

¹⁴ For further information about this workshop and project see: <http://wiki.collectionspace.org/display/collectionspace/CollectionSpace>

¹⁵ See Timothy Murray's featured presentations at the meetings of Fundacio Telefonica, 2010, Buenos Aires ("Conserving, Documenting, Archiving"), and ISEA, 2011, Istanbul ("New Media Archives—New Intelligent Ambiances").

metadata, copyright, and e-publishing units. The program also enables sharing of content through online repositories such as e-publishing systems or institutional and subject repositories.

AudioVisual Preservation Solutions, New York, NY

AudioVisual Preservation Solutions (AVPS) is a full-service audiovisual preservation and information management consulting firm serving the educational, broadcasting, government, non-profit, and corporate sectors. With a strong focus on professional standards and best practices, open communication, efficient workflows, and the innovative use and development of technological resources, AVPS brings a broad knowledge base and extensive experience to efficiently and effectively meeting the challenges faced in the preservation and access of digital content.

AVPS team members are recognized experts in digital preservation, digital repository development and implementation, and the development of tools to support digital preservation and access workflows. AVPS implements digital preservation standards and best practices in order to compliment the needs and goals of projects and organizations. This often includes the Open Archival Information System (OAIS) Reference Model as a benchmark for repository functions and information management, Trustworthy Repositories Audit and Certification (TRAC) as a guideline for operations and sustainability, and Preservation Metadata Implementation Strategies (PREMIS) to support preservation-specific metadata. AVPS brings a unique focus on complex and diverse digital collections, including moving images, sound, still images, digital artworks, custom software, websites, text, and more. AVPS client collections range from terabytes to petabyte in scale. Some recent digital repository development and support projects include the Museum of Modern Art (MoMA), Stanford University Media Preservation Lab, New York Public Radio, and HBO. The expertise in digital preservation repository development and experience with large video objects and complex media that AVPS brings to the project will be of great benefit to successfully attaining the project goals.

C. PROJECT HISTORY

The long history of partnership and collaboration between the Digital Scholarship & Preservation Services (DPS) and the Goldsen Archive has already set new standards for description, cataloging, storage, rights management, and delivery of new media artworks and research materials. The proposed initiative builds directly on a few key collaborative projects between the Goldsen Archive and DPS:

CTHEORY MULTIMEDIA

Since 2003, the Goldsen and DPS have met the ongoing challenge of preserving access to the online archive of CTheory Multimedia, a media art journal that includes interactive Web-based artworks. This net.art archive has been migrated four times. Providing continued access to this collection requires continual updating and obsolescence scans.

Rockefeller/ReNew

From 2006 to 2009, the Goldsen and DPS received a Cornell University Arts and Sciences grant to digitize and provide on-site networked access to the archives of the Rockefeller/ReNew media art competition.

Turbulence

From 2010 to 2012, the Goldsen partnered with Turbulence.org on an NEA-funding project to create an offline repository for the artworks in the Turbulence archives. This project involved the expansion of the Variable Media Questionnaire to provide a more explicit focus on interactive digital material, include more technical metadata about digital artworks, and address the unique problems of digital rights management.

Experimental Television Center

With a 2011-2013 grant from Cornell University's School of Arts and Sciences, DSPS will digitize and provide networked access to analog video artworks in the Experimental Television Center's library through Web-based research interfaces. This project pushes the technical boundaries of the Kaltura delivery system and guides CUL's development with Kaltura. Major decisions about storage, preservation, and workflow for this project were undertaken in consultation with AVPS (our partners in the proposed project).

Metadata and Emulation Research

In 2012, CUL began deeper research into current standards and practices for preserving access to complex born-digital assets. So far, our investigations confirm an emphasis on descriptive metadata and a general lack of practical, tested technical frameworks commensurate to the complexity of interactive digital assets. Developing better ways to manage complex digital assets from the standpoint of preservation is an important next step in this process, and it promises to be valuable for the media art community and the general digital research community.

D. PROJECT SCOPE AND DURATION

We propose a two-year research and development project that will run from January 2013 until February 2015. Our work plan for the project involves both long- and near-term strategies. Our ultimate goal is to create a preservation practice for complex digital assets that includes metadata capture, automated SIP creation, ingest into a digital repository, provisions for conservation and maintenance, and delivery at the best level possible. However, we recognize that there may be feasibility limitations associated with full experiential replication (emulation) of content, and hence will also develop provisional levels of access based on use-case requirements.

Year One: Develop Preservation Framework (see detailed description in methodology section)

1. Profile Current and Future Media Art Researchers and Their Needs
2. Collection Analysis and Selection of Classes
3. Identify Significant Properties and Build Out Digital Object Model / Metadata Profile
4. Build SIP Requirements Based on Findings: SIP Definition and Creation for Classes of Works

Year Two: Implementation into Repository Environment

1. Automated Processing and Ingest of SIPs into CUL Archival Repository
2. Test Pull of Dissemination Information Packages (DIPs)
3. Testing Against Full Range of Assets within Selected Classes
4. Definition and Creation of Access Versions
5. White Paper Composition

CUL anticipates the following generalizable outcomes from this project:

- Technical analysis of the Goldsen Archive's interactive digital holdings and documented methodology, which will be highly instructive for comparable collections
- Generalizable user profiles for new media art (with access version);
- A viable object data model for complex digital objects with associated metadata profile (Metadata Encoding and Transmission Standard (METS) and/or Resource Description Framework (RDF);
- SIP structure to support long-term preservation of objects, provisioning for future emulation development, with associated automated workflow for SIP generation and ingest, tested and vetted by CUL's ingest process; and

- A full report of this process, including financial and time expenses, so that other institutions might gauge the feasibility of a comparable project with their own complex media collections.

E. METHODOLOGY AND STANDARDS

Because this undertaking is complex and ambitious, we broke it down into the following discrete but overlapping projects, each with an opportunity for evaluation of success and dissemination of results. Year One will focus on the development of the preservation framework and associated workflows needed to ingest new media artworks into a digital archival repository with sufficient metadata for long-term preservation. Year Two will focus on actual implementation and automation of the developed preservation framework via pushing assets within the Goldsen Archive to the CUL Archival Repository. As part of this process, we will ensure data integrity through checksums and validation of the SIPs as well as by pulling Dissemination Information Packages (DIPs) to test the overall structural integrity of the SIPs.

Year One: Develop the Preservation Framework

1) Profile Current and Future Media Art Researchers and Their Needs

Our first goal is to determine use scenarios for different kinds of media art researchers. By building out use-case scenarios, we will develop a better sense of various users' requirements for access to interactive digital assets.

For example, an arts educator might have different needs than a professional artist or art student. The needs of one might be adequately, if imperfectly, satisfied with a screen shot of an interactive artwork; another might require more information about the work's interactive properties. A narrative description of interaction might be enough for an arts researcher, whereas a software historian might require information about file types, information architectures, original storage devices, pre-migration platforms, or code.

Because of the technological complexity of preserving access to these assets, CUL may not be able to fully render these pieces through time with existing technology, but we may still be able to satisfy baseline requirements for a subset of users. We need to understand the baseline access needs of current users — and anticipate the needs of future users — to build out a feasible preservation methodology.

In consultation with the media art archivists, educators, and practitioners on our advisory board, we will develop a questionnaire about visitors, researchers, and research inquiries to media art archives in this country. We will submit this questionnaire to archivists, academics, and practitioners via listservs and direct inquires, and analyze the results to develop a better profile of how people use media artworks in research repositories. Equally important, we will conduct a number of one-on-one interviews with researchers to further our understanding of their needs. Our findings from this initial research phase will guide the rest of our project.

Activities

1. Develop generalizable survey for determining varying needs of researchers working with new media objects;
2. Working with Advisory Board, disseminate survey to key set of researchers;
3. Interview a subset of users one-on-one
4. Analyze results to determine generalizable user profiles with associated access requirements.

Deliverables

1. User profiles with associated requirements for long-term access of new media art.

2) Collection Analysis and Selection of Classes

To develop our metadata and SIP requirements and subsequent automated ingest of complex media, we need better technical data about the contents of the collection itself. This need demands a better way of evaluating the nature and risk of the various pieces within the collection. Comparable assessments have been undertaken with collections of complex digital objects, such as the Preserving Virtual Worlds project¹⁶; however, no test bed for forensic assessment has been as broad, rich, complex, or wide-ranging as the interactive holdings of the Goldsen Archive.

We will capture file formats, hierarchical structure and relationships, hardware and software requirements (including operating systems and browser support), and other technical elements in an automated and systematic way. In consultation with the project advisors knowledgeable in digital forensics, and referencing similar projects already undertaken at the University of Maryland and Stanford University, we will evaluate the entire interactive collection. We will use this assessment to identify high-risk material based on risk of obsolescence for hardware, software, or browsers; material degradation or bit-rot; and critical dependencies such as relational and file structure contingencies. This assessment will establish the asset categories based in information architecture and technological risk-level for the next phase of the project. Ultimately, this analysis will provide a foundation for the preservation track by offering a baseline profile of the Goldsen Archive's holdings. Establishing an automated process for collection assessment would prove invaluable for comparable collections of interactive digital material.

To reach our goal of developing a comprehensive Submission Information Package (SIP) that will contain appropriate content, metadata, and documentation required to support long-term access to new media artworks throughout evolving technological landscapes, this analysis of artwork characteristics will inform the required documentation for various classes of works at the hardware, software, operating system, and file levels. The analysis of the collection will inform the development of groupings, or classification of works, which share common representation information,¹⁷ that can be used to form the initial structure of a SIP, and thus establish SIP classes.

The formation of a data model that will capture those required dependencies and structural information will begin at this phase. The data model definition will start with the identification of critical information entities that will need to be captured (processors, input/output devices, operating systems, software, libraries, file groupings), and the relationships between those entities. This phase will lay the groundwork for the later development of the detailed attributes of each of these entities.

From this assessment, we propose to select two to three distinct, but related, "classes" of material to test; for instance, a "class" might consist of a group of works created with the same software; related "classes" might represent a single software environment that functioned in CD-ROM and migrated to the web. We will, however, let our findings and the advice of our consultants guide our selection in this project phase. In making this selection, we will primarily look for categories that have: large impact—that is, exhibit information structures with potentially broad prevalence, even outside the Goldsen collections; good chance of success, and seem particularly viable for migration and potential future emulation; and scholarly value, specifically, we will seek categories that represent especially culturally significant artworks.

¹⁶ <http://pvw.illinois.edu/pvw/>

¹⁷ OAIS defines representation information as, "The information that maps a Data Object into more meaningful concepts. An example is the ASCII definition that describes how a sequence of bits (i.e., a Data Object) is mapped into a symbol." Accessed 27 April 2012 from Consultative Committee for Space Science Systems, *Reference Model for an Open Archival Information System*, CCSDS 650.0-B-1, January 2002, p 1-13. <http://public.ccsds.org/publications/archive/650x0b1.pdf>

Activities

1. Develop framework and methodology for analysis of complex objects and identification of classes of works that share characteristics and dependencies;
2. Analyze CD-ROM and Internet Art to determine classes and groupings based on shared characteristics and dependencies;
3. Identify/develop appropriate data model for documentation of classes and representation information, beginning by reviewing existing data models;
4. Working with advisory board, select subset of classes of material to test, based on broad impact, feasibility, and scholarly value;
5. After selection by Cornell and the Advisory Board of the two or three priority classes, document representation information for each class using the data model; and
6. Revision of data model and classes as necessary based on findings from step 5.

Deliverables

1. Framework and methodology for analysis and classification;
2. XML document for collection's item-level metadata as captured in broad-stroke forensic analysis;
3. Data model for classes and representation information with accompanying documentation; and
4. Population of the data model for each class as parsed from digital forensic analysis.

3) Identify Significant Properties and Build Out Digital Object Model/Metadata Profile

We will next hone in on specific preservation requirements for works within the selected classes of material. Whereas we initially focused on a broad-stroke analysis at the collection level to determine different classes of material, this next phase will detail the necessary technical components needed to preserve and render the artworks into the future for items within those classes. We envision this as a multi-step process.

First, we must develop the framework and methodology for analysis of complex objects within each class. A key challenge will be to define the rationale for selecting a significant property, and documenting these explanations in sufficient detail and quality to serve as a project deliverable. For example, within a given class of material, certain core behaviors (such as interactivity) are rendered by specific technologies. Technological pieces that enable those behaviors would qualify as significant properties, which need to be articulated, analyzed, documented, and expressed in a defined structure. Decision-making and research will be needed to identify which properties are truly significant and the implications for when those properties obsolesce. In establishing our criteria to define those significant properties, we will make provisions for future advances in emulation.

With a methodology established, significant properties will be defined for the selected classes of works with the aim of addressing the detailed attributes of the various components required to render a work, both from a purely technological standpoint, and as they relate to the work's intended behaviors, display, and functionality. This will involve a breakdown of the artworks' rendering environments, to determine what technical components are mandatory for long-term preservation and access.

Lastly, we will refine the initial data model developed to capture the significant properties for selected objects. This will define the technical and administrative metadata required for preservation of complex objects and the subsequent metadata framework. As a subset of the administrative metadata, we will capture rights management metadata — including but not limited to information about donor agreements and licensing contracts — to facilitate decision-making on use and preservation strategies. This may be included as PREMIS Preservation Metadata within the METS wrapper or built into the RDF and ontology.

We will likely build on METS and/or RDF. Rigorous analysis of the strengths and weakness of each will be conducted, addressing their suitability to effectively express complex metadata, meet local metadata requirements, and meet the needs and goals of our partners and sister collections.

METS is well-established in the library and digital preservation communities as a logical wrapper of information packages. It provides a means for expressing the structure of metadata and content files within a package, but is limited in how it can express relationships between those files, and also between the files and metadata that describe them. In contrast, RDF, and an associated family of standards, including RDF/XML, OWL, SPARQL and SKOS, provide a highly flexible means for expressing not only relationships between files, but between all concepts (i.e. metadata) about those those files. While METS is widely adopted, and even locally implemented at Cornell for structural metadata during ingest into our digital archival repository, many organizations (including the Preserving Virtual World's initiative¹⁸) are moving toward RDF and developing OWL ontologies for defining semantic metadata (i.e. meaningful) that can be expressed and understood by machines, providing an additional layer of value over the traditional syntactic methods of encoding metadata. Further, RDF allows for flexible and expandable description, which could aid long-term iterative expansion of preservation metadata for these objects.

Regardless of the decision, our goal is to produce shareable results. If METS is chosen, a METS profile will be developed and submitted to the Library of Congress for registration and use by other organizations with similar collections. If RDF is chosen, an OWL ontology for the expression of data about interactive media art will be developed and disseminated. Both options will likely be tested during this project, and thus both the METS profile and the OWL ontology may be disseminated.

Activities

1. Develop framework and methodology for analysis of complex objects and identification of significant properties (similar but distinct from previous methodology at collection level);
2. Perform analysis of complex objects within selected classes to identify their significant properties;
3. Continue development of data model and add documentation of complex object component parts and significant properties for selected objects;
4. Build-out METS profile and/or RDF/OWL ontology; and
5. Revision of data model and significant properties, as necessary.

Deliverables

1. Framework and methodology for analysis and identification of significant properties;
2. Revised data model, including significant properties;
3. Continued population of the data model for selected works;
4. Publishable METS profile and/or RDF data model and ontological work.

4) Build SIP Requirements Based on Findings: SIP Definition and Creation for Classes of Works

This process will involve developing packages for new media objects that contain the complex elements and metadata required to preserve them. In consideration of the Open Archival Information System (OAIS) data model, the developed SIP structure will conform to international standards and should be generalizable for other collections of new media art and complex media types.

We will build upon investigation and work already performed between CUL-Information Technology, CUL-DSPS and CUL-Metadata Services to define descriptive, administrative, and rights metadata that

¹⁸ For the Preserving Virtual Worlds ontology work, see: McDonough, Jerome, et al. "Preserving Virtual Worlds Final Report. Appendix C - Preserving Virtual Worlds Ontology". Available: <http://hdl.handle.net/2142/17097>

will be captured as part of the SIP; we will also determine how we might automate the process from existing catalog records, and augment manually as necessary.

Investigation in this phase will define the content, metadata, and packaging specifications for the SIPs as they relate to each class. We also assume that the hardware/software described by representation information will not be captured as part of the SIP (i.e., we will not address wrapping Mac OS9 in the SIP, but we will document it and its relevant properties). This process will be documented in sufficient detail and quality to serve as a project deliverable.

Activities

1. Identify required metadata beyond representation information and significant properties, such as descriptive and rights information;
2. Define content, metadata, and packaging specifications for identified classes;
3. Develop SIP creation protocol and methodology for each class; and
4. Develop SIP validation definition.

Deliverables

1. SIP specification for each selected class;
2. SIP creation protocol document for each selected class; and
3. Sample valid SIPs.

Year Two: Implement into Repository Environment and Publish Results

With an SIP structure in place for the articulation and documentation of key significant elements needed for the preservation of a complex digital object, we will begin the process of pushing assets to the CUL Archival Repository. This will be an iterative process, whereby we uncover potential problems within the preservation framework and revise accordingly. We have the following goals established for this phase of development:

1) Automated Processing and Ingest of SIPs into CUL Archival Repository

With our data model established at the class level, we will need to build out the associated workflow to package and ingest the SIPs into the digital archival repository in an efficient manner. To this end, we will investigate automation strategies such as BagIt and Dflat to streamline the process. Given the complexity of the material in terms of file structure, file type, and description, we anticipate that an individual artwork will comprise a SIP, and we will build out our workflow accordingly.

Once we have an established ingest methodology and automated the creation of SIPs, we will validate them and ensure data integrity through the use of checksums. Although much of this research will be contingent on our specific repository environment, we believe that it will be generalizable enough to provide a starting point for other institutions to do similar work. All work will be documented in sufficient detail to serve as a project deliverable.

2) Test Pull of Dissemination Information Packages (DIPs)

Ultimate success of this project relies on the ability of others outside of Cornell's current institutional infrastructure to take a DIP and use its contents. To this end, and working closely with our advisory members, we will select a partner institution knowledgeable about new media artwork and preservation infrastructure to take one of the CUL packages and validate and understand its contents.

3) Test against Full Range of Assets within Selected Classes

Testing the developed model is an integral part of any R & D effort. Following the model development, it will be tested comprehensively for the two or three defined classes. Ideally, comprehensively ingesting the classes to CUL's digital archival repository will result in the actual preservation of the assets within the collection.

4) Definition and Creation of Access Versions

In instances when rendering the original is too onerous a task or technically unfeasible, it helps to define an acceptable access copy for a given class. These may include screen grabs, screen recordings, video recordings, images, and thorough documentation of the work. When an access copy is generated, it remains to be determined whether it is incorporated into the SIP. Our efforts will be informed by the user profiles generated in the first year, in collaboration with the Advisory Board.

With an established methodology, we will create access versions for pieces in the priority classes as an initial test, which will inform the ultimate access strategy for the entire Goldsen Collection.

5) White Paper Composition

One primary deliverable will be a white paper that explains our project and its associated outcomes. All technical strategies and specifications will be articulated, as well as the factors that informed our decision-making process. We will also address a range of practical issues, including costs associated with the study, resources required to move the project into a program, lessons learned, and scholarly uses of new media art to enable us to estimate future use by scholars and students.

F. WORK PLAN

The Project Scope and Duration section details the work plan. The following table includes a schedule indicating what will be accomplished during each stage of the project.

Acronyms Used: CUL team: Includes co-PIs, Casad (Project Manager), Kovari, Mericle, Muller; AVPS: AudioVisual Preservation Services; AB: Advisory Board; DMC: Digital Media Technician

TASKS	STAFF	Year 1				Year 2			
		1	2	3	4	1	2	3	4
	<i>QUARTERS</i>								
PROJECT INITIATION									
Project initiation meeting and review of work plan and staffing	CUL team, AVPS	x							
First advisory group meeting	CUL team, AVPS, AB	x							
PRESERVATION FRAMEWORK DEVELOPMENT									
Develop a survey to determine use scenarios for different kinds of media art researchers	CUL team, AB	x							
Implement the survey and analyze results to determine generalizable user profiles	Casad, Kovari, Mericle		x						
Develop framework and methodology for analysis of complex objects and dependencies	AVPS, DMC, Kovari	x	x						
Perform analysis of CD-ROM and Internet Art to determine classes and groupings	Casad, DMC		x	x					
Identify appropriate data model for documentation of classes and representation information	AVPS, Casad, DMC, Kovari		x	x					

TASKS	STAFF	Year 1				Year 2			
		1	2	3	4	1	2	3	4
	<i>QUARTERS</i>								
Select subsets of classes of material to test based on broad impact, feasibility, and scholarly value	CUL team and AB			x					
Document representation information for each class using the data model	Casad, DMC, Kovari,			x	x				
Revise data model and classes as necessary based on findings	Casad, DMC, Kovari,				x				
Develop framework and methodology for analysis of complex objects and significant properties	AVPS, DMC, Kovari, AB			x	x				
Perform analysis of complex objects within selected classes to identify significant properties	DMC, Casad				x	x			
Document significant properties for selected objects and test data model	AVPS, DMC, Casad, Kovari				x	x			
Build-out METS profile and/or RDF/OWL ontology	AVPS, DMC, Kovari,				x	x	x		
Revise data model and significant properties, as necessary	Casad, DMC, Kovari,					x	x		
Identify required metadata for documenting descriptive and rights information	Casad, Kovari, Mericle				x	x			
Define content, metadata and packaging specifications for each identified classes	Casad, DMC, Kovari				x	x	x		
Develop SIP creation protocol and methodology for each class	Casad, DMC, Kovari					x	x		
Develop SIP validation definition	Casad, DMC, Kovari					x	x		
IMPLEMENTATION									
Automate SIPs into CUL Archival Repository	DMC, Paolillo					x	x	x	
Test pull of DIPs	DMC, Paolillo							x	
Testing against full range of assets within selected classes	Casad, DMC, Paolillo						x	x	
Define and create access versions	CUL team, AB							x	x
DISSEMINATION AND EVALUATION									
Review and expand dissemination plan	Co-PIs	x							
Conference call with project advisors to review work in progress	Co-PIs, Casad			x		x			
In-person meeting with project advisors	AV, CUL Staff, AVPS,	x						x	
Write white paper, assess findings, document expenses	CUL team							x	x

G. STAFF AND ADVISORY BOARD

The project team is uniquely qualified to undertake the proposed research. Its members possess the requisite skills and experience to manage and perform all proposed work.

Timothy Conway Murray, Co-Principal Investigator (10% cost share): Murray is Professor of Comparative Literature and English; Curator, The Rose Goldsen Archive of New Media Art; and Director, Society for the Humanities at Cornell University; Executive Board, HASTAC (*Humanities, Arts, Science, and Technology Advanced Collaboratory*). He will co-lead the project and, with his expertise in curation, teaching, and research, he will ensure that the initiative is informed by practices of scholars and artists. The author of 20 books and edited collections, he has extensively published on the holdings and curatorial issues pertaining to new media art and the Goldsen. He has organized exhibitions and has been invited to speak on the digital humanities, new media curating, artistic copyright, and law, film, and visual studies.

Oya Y. Rieger, Co-Principal Investigator (10% cost share): Rieger is Associate University Librarian for Digital Scholarship and Preservation Services. She will co-lead the project, with a focus on digital preservation and sustainability. She participates in several national and international curation and repository initiatives and is a member of the Center for Research Libraries (CRL), Trusted Digital Repositories Certification Advisory Panel. She has extensive experience in digital preservation, sustainability planning, policy creation, and implementation efforts. Her doctoral work focused on exploring the role of new media in humanists' scholarly and artistic work and collaborations.

Madeleine Casad, Project Manager (50%): As Associate Curator of the Goldsen Archive, she has worked with complex digital artworks for 10 years as a researcher, teacher, and curator. Dr. Casad will be responsible for daily project oversight and coordination, including project planning, collection analysis, communication, reporting, assessment, and dissemination of project results. Her current position is appointed at .5 FTE; grant funds will bring her to full-time for the duration of the project. Her doctoral work and ongoing academic research focus on the intersections of art, digital media, and cultural memory. Since joining the Goldsen Archive in 2002, she has participated in several projects to preserve, promote, and expand access to the Goldsen's new media holdings.

TBD, Digital Media Technician, (50%): We will appoint an existing CUL IT staff member to work with the team in implementing collection analysis, setting technical standards, recovering digital data, and testing preservation strategies. The tasks performed by the technician will be similar to a computer forensic analyst, entailing identification of digital data and media characteristics and data recovery. The position will require background in legacy formats, file systems, operating systems and applications, and hardware. A draft job description is included in the Appendices section.

AudioVisual Preservation Solutions (320 hours): AVPS will be a critical project partner by advising the Cornell team on the collection level analysis, working with team members to analyze works, determining requirements for representation information and significant properties, and providing significant contributions to the development and documentation of the metadata model. The project will leverage tools that AVPS has developed for file-based collection analysis and reporting. AVPS is currently consulting on other initiatives to preserve digital media art, including leading the development of the Museum of Modern Art's repository for its digital art collections. Their role in the proposed project is further explained in the Appendices section.

Jason Kovari, Metadata Specialist (10% cost share): Kovari is Metadata Librarian for Humanities and Special Collections and will work on development of the metadata framework. He serves on the Cornell University Library Archival Repository (CULAR) steering committee and provides metadata consultation

on a wide range of digital projects. Before arriving at Cornell, Kovari was a Digital Initiatives Librarian and worked on a large-scale audiovisual digitization grant with provisions for long-term digital preservation.

Danielle Mericle, New Media Specialist (10% cost share): As the director of CUL's Digital Media Group, Mericle will assist in the overall analysis of the collection and associated user requirements, as well as participate in building out the broader preservation framework. Mericle has worked extensively with the Goldsen, from managing projects to digitizing holdings (including complex paper holdings and A/V content) to make them broadly available. She has broad knowledge of digital preservation practices and metadata standards and has taught numerous workshops in digital stewardship and sustainability. As a practicing artist and adjunct professor of art photography, she will also bring a perspective that is sensitive to the needs of artists and teachers working with new media content.

Liz Muller, Archivist (10% cost share): Muller is the Curator of Digital and Media Collections and Head of Archival Technical Services in CUL's Division of Rare and Manuscript Collections. She will advise the team on metadata best practices, as well as the application of digital preservation and access strategies in archival contexts. Muller's involvement in digital library projects began nearly 15 years ago, with the development of an interactive CD-ROM for the Library of Congress during the 1990s. She has extensive expertise with the description of special collections and visual materials, and she has taught and presented widely on topics related to metadata and image resources.

Michelle Paolillo, Archival Repository Liaison (5% cost share): As the manager of the CUL's archival repository, she will assist the team in developing ingest procedures and tools that are consistent with CUL's open source repository structure. She will ensure that the outcomes of the project are interoperable and are compliant with CUL's infrastructure. Relying on the CUL archival repository steering group, Paolillo will also act as a liaison on IPR and other information policy issues.

Advisory Board

The Advisory Board will provide ongoing advice to the project team to ensure that the professional perspectives of archivists, historians, technologists, artists, and digital media specialists inform activities and products. At the outset of the granting period, the Advisory Board will convene at Cornell to share its experience in curating, archiving, and delivering new media art with the aim of informing the project. The group will assess CUL's project plans and recommend related work to build on existing standards, procedures, and best practices. Two follow-up meetings will be conducted via conference call. During the second year, there will be another in-person meeting to review and assess progress. The board is composed of seven internationally recognized experts:

- **Priscilla Caplan** (Assistant Director for Digital Library Services at the Florida Center for Library Automation) oversees the Florida Digital Archive, a digital preservation repository for the use of the public universities of Florida. She was co-chair of the Preservation Metadata: Implementation Strategies (PREMIS) Working Group and currently serves on the PREMIS Editorial Committee.
- **Ben Fino-Radin** (Digital Conservator, Rhizome at the New Museum, New York, NY) has expertise in developing and managing digital art archives, including creation of preservation policies and procedure and repairing artworks that are affected by technological obsolescence. He is an artist and researcher specializing in the preservation of digital culture & ephemera.
- **Jean Gagnon** (Director, Montreal Cinemateque, Canada) has over 20 years' experience in audiovisual collection and archives management. He is the former Director of the Langlois Foundation and co-founder of DOCAM, and he also has taught at Canadian universities and served as a consultant to cultural organizations.

- **Matthew Kirschenbaum** (Associate Professor of English, Associate Director, Maryland Institute for Technology in the Humanities, University of Maryland) specializes in digital humanities and digital preservation. He was the co-investigator of two studies that have influenced our proposal: “Preserving Virtual Worlds and Digital Forensics” and “Born-Digital Content in Cultural Heritage Collections.”
- **Norie Neumark** (Director, Centre for Creative Arts & Chair and Professor, Cinema and Media Studies Program, La Trobe University, Melbourne, Australia) is a sound/media artist and theorist. Her media art work, including installation, Internet, and CD-ROM, has been exhibited nationally and internationally. She was the founding Director of the Centre for Media Arts Innovation (CMAI) at University of Technology at Sydney and a founding member of the Rose Goldsen Archive International Advisory Board.
- **Christiane Paul** (Adjunct Curator of New Media Arts, Whitney Museum of American Art) is a scholar in the field of digital art and a historian of art and technology. In addition, she is Professor of Visual Arts and Director of Graduate Programs in Media Arts at New School for Public Engagement, New York. She was a co-PI of the Variable Media Initiative.
- **Richard Rinehart** (Director, Samek Art Gallery, Bucknell University) is a new media artist who is engaged in several research projects in the area of digital culture and preservation. He was previously the Digital Media Director and Adjunct Curator at the UC Berkeley Art Museum/Pacific Film Archive. He has taught digital art studio and theory at UC Berkeley in the Center for New Media and Art Practice departments and served as co-PI of the Variable Media Initiative.
- **Simeon Warner** (Director, Software Development & Repository Architecture, Cornell University Library) is an expert in digital library and preservation technologies and architectures, as well as best practices and national and international standards. He leads a team of software engineers and programmers who create and manage a range of repositories that support Cornell’s digital collections.

H. SUSTAINABILITY OF PROJECT DELIVERABLES

As part of CUL's ongoing commitment to sustain its digital collections, the Library maintains an OAIS compliant system for managing Cornell's digital assets, including the Goldsen Archive materials. The Fedora-based system has a manager (included in the proposal as 0.05 FTE cost-share) and is guided by a cross-functional steering group. CUL has a digital preservation policy framework that delineates issues such as resources, governance, disaster recovery, risk assessment, intellectual property, and content access and use; therefore, an existing, streamlined infrastructure already exists for implementing and managing the outcomes of the proposed project.

Additionally, the home of Goldsen Archive, CUL’s Division of Rare and Manuscript Collections, has a proven commitment to maintaining and promoting its collections. It regularly hosts seminars, presentations, and tours on its holdings for students, faculty, visiting researchers, and community groups. RMC’s activities will promote the use of Goldsen Archive and its integration in research and teaching activities, and the division is committed to the goal of making the Goldsen sustainable.

The Goldsen Archive is an ongoing initiative — a mainstreamed responsibility. Therefore, we are not applying for funds to support a particular phase of a project; rather, we are asking for funds that will make it possible to use a concentrated amount of resources to accomplish a critical goal that can be leveraged

for our community. The project team is committed to continuing advancement and experimentation in digital preservation. This responsibility is an integral part of their positions and they will continue to test, refine, and implement tools and policies developed through the project. We expect the outcomes of our project to be beneficial not only to new media art, but to other genres of born-digital content as well.

I. DISSEMINATION

We intend to share the outcomes of this initiative with the technical, library, museum, art, and scholarly communities in multiple ways. CUL's primary goals will be disseminating information about the initiative (process, outcomes and lessons learned); sharing managerial and technical tools with other cultural memory organizations; and advancing the community's experience and understanding of new media art (and A/V) curation and preservation practices.

Primary dissemination methods will include:

- 1) We will set up a project wiki to document and disseminate the results of our project. This wiki will include information about tools and strategies, as well as implementation information to connect our solutions with the challenges in archiving, discovering, and using new media content.
- 2) We will announce the project's goals and methodology in venues such as the Humanities, Arts, Science, and Technology Advanced Collaboratory (HASTAC), National Digital Stewardship Alliance, and Digital Preservation Coalition (UK), ISEA (Inter-Society for the Electronic Arts), and the international new media listserv, -empyre-, hosted by the Goldsen Archive. We will use these forums for ongoing communication to get input and increase awareness about our project. We will also use relevant mailing lists to disseminate information about the project, gather input, and share project outcomes.
- 3) We will write a white paper. The paper will be to illustrate how we conducted our project as well as describing the outcomes. We will also address a range of practical issues, including costs associated with our study, resources required to move our project into a program, lessons learned, and scholarly uses of new media art to enable us to improve scholars' and students' future use of the Goldsen.
- 4) We will connect to national and international initiatives and organizations engaged in exploring curatorial and archival issues for preserving and providing enduring access to A/V content.
- 5) For the duration of the project, the CUL team will aim to present at least at four conferences, such as the Coalition for Networked Information (CNI) Forum, the Digital Humanities Conference, iPres Conference (International Preservation Conference). The co-PIs (Murray and Rieger) often participate in national and international preservation and humanities scholarship forums. Through their ongoing professional engagements, they will promote CUL's initiative, inform colleagues of the outcomes, and gather input to ensure that the proposed system will fulfill actual needs.
- 6) Cornell's Society for the Humanities (directed by Murray) and the Goldsen Archive often collaborate to host conferences and forums (both in-person and virtual). These ongoing scholarly forums will provide a structure for discussion of our work and the needs of scholars and artists.